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VOLUME 19, NUMBER 48A

DECEMBER 4, 1985

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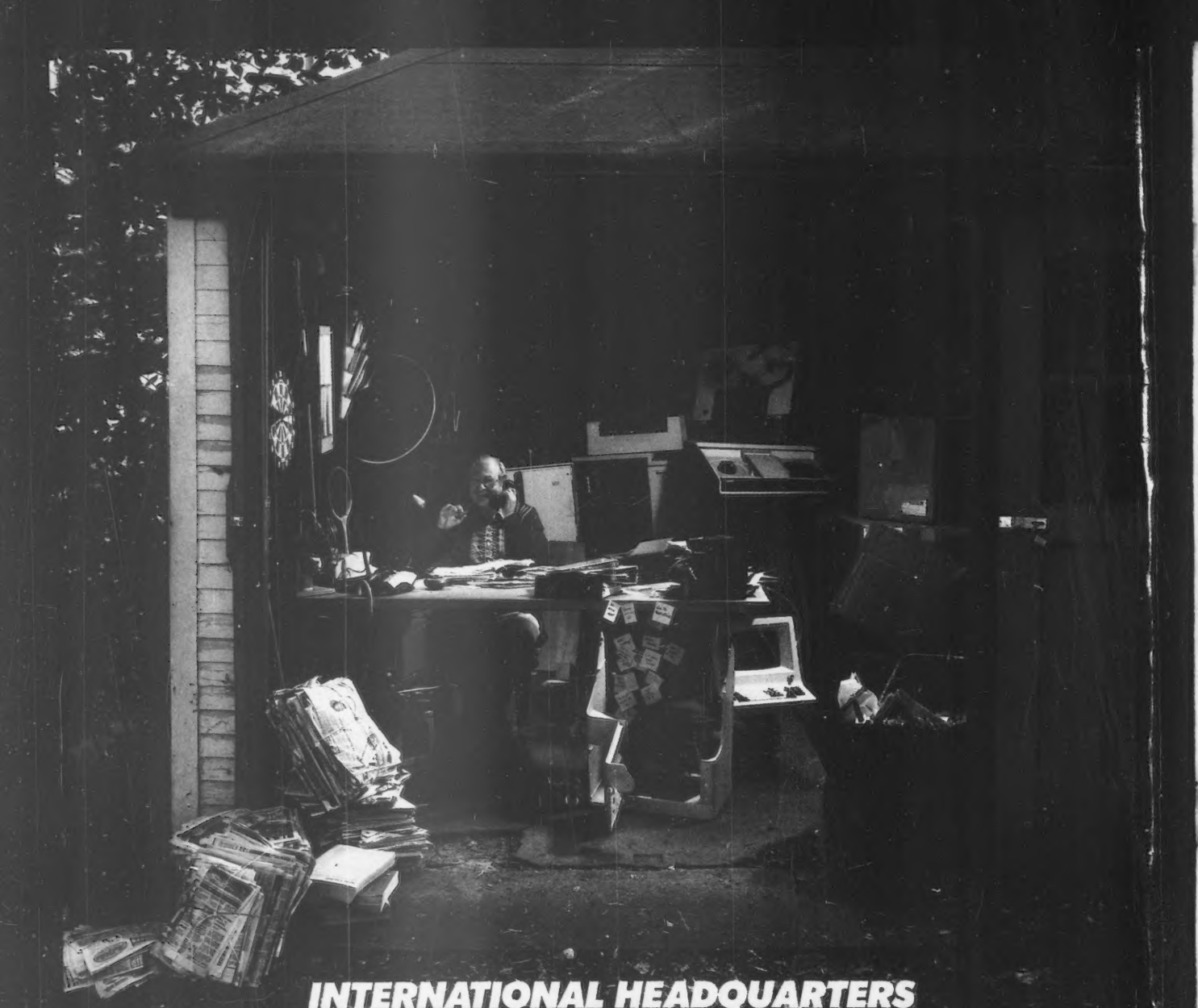

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Editorial

Catching up with IBM

George Havior

We tried in these 124 pages not to stop IBM in one place and take a picture but rather to catch the company in motion. Some of the pictures are blurry because IBM changes even as you are staring at it — announcing the token-ring network, for instance, or adding the vector facility to the 3090. The best observers can do is take a good shot of the moving target and then analyze what they see.

That's what we asked our writers — including Gideon Gartner, Frank Gens, George Colony and Paul Hessinger — to do.

This *Computerworld Extra* is broken into three main sections: The Company; Products (and Alternatives); and Strategies. Remember the alternatives — our authors mention many. The issue is all about IBM, but we're not implying that the best products or services are necessarily IBM's. Then again, we're not implying that they aren't either. (That's our disclaimer.)

We tried a radical approach to IBM in this issue: We asked questions and actually expected answers. "Ask IBM" runs on page 116. You don't often see those two words — "Ask IBM" — together because no one (no journalist, anyway) expects the folks at Armonk to answer a direct question. We decided to ask anyway, as kind of an experiment. Executives at Citicorp, Amoco, Cornell University, Western-Southern Life Insurance Co. and Cities Service furnished the questions. You judge whether IBM answers.

Another exclusive department — IBM International — comes to us through the *Computerworld* News Service. This network of computer industry journalists covers the world. Beginning on page 102, they analyze IBM's NTT connection in Japan, its slipping sales in France, the easing of barriers to its doing business in Brazil, discounting in Australia and more.

In "Comment," we present Gartner's overview of IBM's recent hunger for mergers and acquisitions. Also, International Data Corp.'s Gens takes apart IBM's distributed processing strategy and finds a mainframe inside.

In the Strategies section, Colony writes that the Personal Computer is looking a bit shabby these days and predicts the imminent arrival of a dressed-up PC2. In the Products section, Hessinger tells where IBM is taking users of IMS and DB2, like it or not.

Finally, if you have your own comment about IBM, *Computerworld Extra* or the computer industry in general, drop us a line. We'll respond.

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Comment

Buying big to grow big

By Gideon Gartner

During the late 1970s, IBM decided to raise its internal growth objectives. The company, which by ordinary business standards had achieved a fairly steady growth in revenue and earnings of 13% per year for five years, was going to attempt an extraordinary feat — increasing its trendline growth by three percentage points or more to a minimum of 16% per year.

Anybody with a calculator could compute the mind-boggling implications immediately. Over the next 10 years, the difference in aggregate IBM revenues between the new 16% objective and the old 13% actuality would exceed $150 billion. By the end of this 10-year period, IBM would be generating $50 billion more in revenue per year — a sum equivalent to the size of IBM today.

Fundamental to this increase in expectations was IBM's belief that the industry at large was growing at approximately a 16% rate. With the shackles of antitrust behind it, IBM management realized that its fiduciary duty was to attempt to grow at least as fast as the market as a whole. This attitude stood apart from the company's performance in recent decades, when it customarily lost market shares year after year.

How was IBM to achieve this huge and discontinuous expansion in growth rate?

Its first strategic thrust came in a substantial increase in capital investments. Throwing dollars at plant expenditures and creating production capacity at a rapid rate, IBM put itself in a position to produce the volumes necessary to meet its new objectives.

Make vs. buy

Of course, this indulgence was to result in significant competitive implications, such as an aggressive cost structure and shorter delivery cycles that produced a bigger market share for IBM. Its objectives were, at least from its internal viewpoint, rational and responsible.

Gideon Gartner is president of Gartner Group, Inc. in Stamford, Conn.

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Comment

IBM rapidly found that with an increasingly diverse product line and larger business volumes, it would have to depend more on outside suppliers for components and peripherals. Thus, the company accelerated its diversification activities, primarily in the area of joint ventures, licensing agreements, OEM arrangements and so forth.

But soon IBM saw that its frequent make/buy decisions with respect to a component or system peripheral would have to be enlarged in concept. The issue of 16% growth hangs on a myriad of decisions that IBM had to make in succeeding years: whether the company could develop its system diversification in-house through innovation or whether it needed to make direct investments leading to possible buy-outs of other firms to meet its goals.

For three principal reasons, as IBM looks at the broader issues of make/buy, it has been slipping into the buy mode — apart from the obvious fact that diversification into businesses where IBM had relatively little expertise required direct investment in external organizations.

First, IBM has been forced to rethink its earlier assumption that the market, overall, was growing at 16%. What if the market didn't continue to grow? Then, clearly, IBM would find it strenuous — and the rest of the industry would find it exceedingly debilitating — to watch IBM attempt to grow at a rate substantially faster than the overall market.

As IBM looks at the broader issues of make/buy, it has been slipping into the buy mode.

This logic led to IBM's move to hedge its bets by buying. In the event that the overall market was to grow more slowly than its newly set 16% objectives, IBM could still meet its goals by absorbing revenue streams that other firms had built earlier.

Second, IBM's attempts at innovation in the 1970s did not go well. Except for the Personal Computer activity, the honeymoon with IBM's independent business units was ending fast.

As IBM failed, for a variety of reasons, to assimilate these units into the mainstream or to convert them into sizable businesses that could contribute meaningfully to IBM's goals, the company shifted gears toward the

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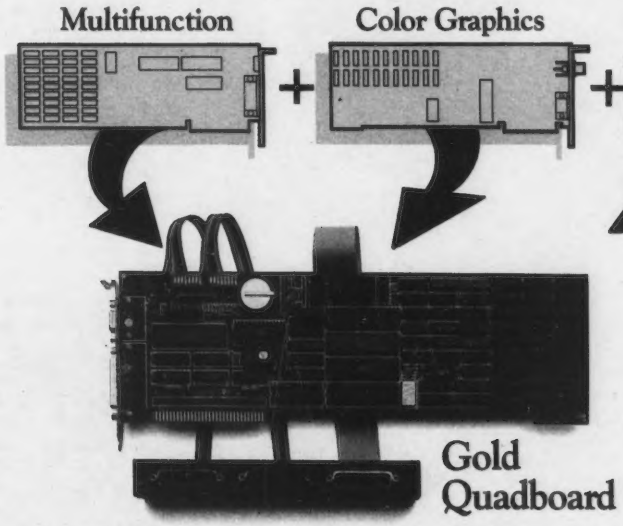

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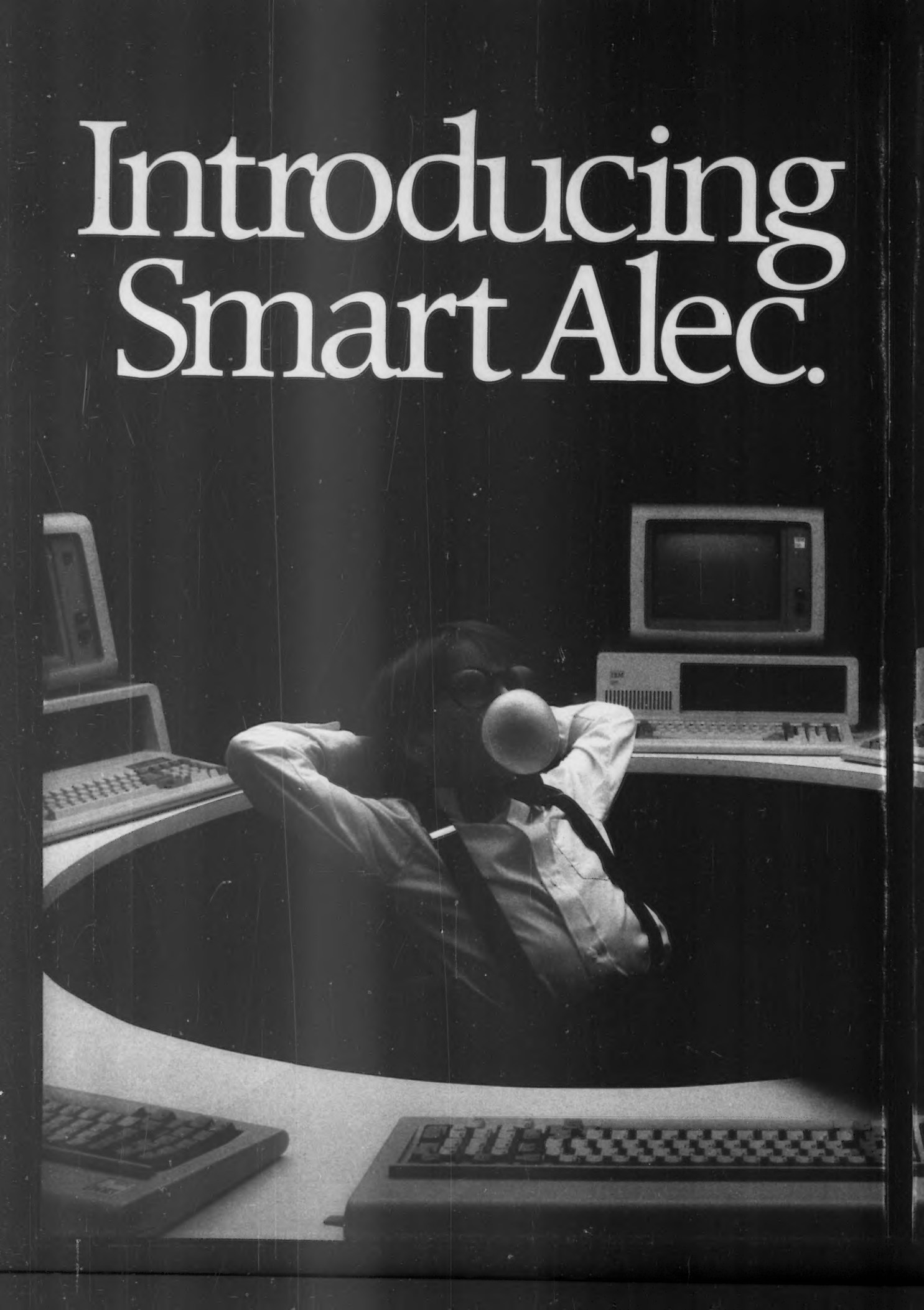

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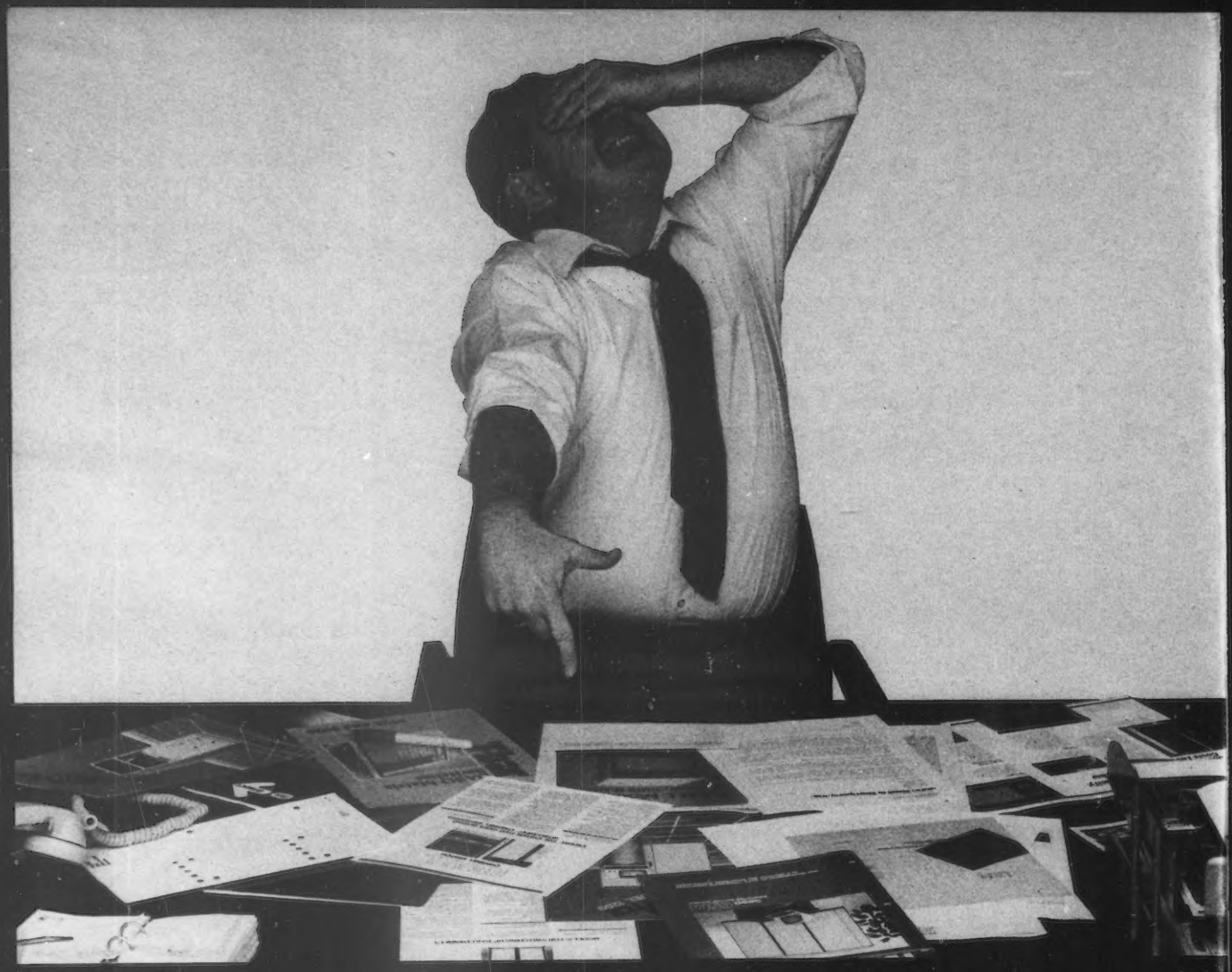

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Comment

need to accumulate revenue through external acquisition rather than through internal development.

Third, along these same lines, IBM recognized that there is an inherent conflict between achieving fast growth and maintaining high profit margins. All else being equal, these corporate objectives are mutually exclusive.

In terms of the margin, the next product being developed encompasses greater risk than the product before it. The company would naturally pursue its highest profit opportunities first. But as IBM jumps into diverse market opportunities, it is forced to embrace lesser product opportunities.

In this context, IBM found that some of its diversification adventures were achieving minimal profitability or, worse, losing bushels of money.

IBM found that some of its diversification adventures were achieving minimal profitability or, worse, losing bushels of money.

It appeared then somewhat more attractive to focus on external companies with visible profit functions as part of an overall diversification strategy.

Let's size up the problem for a moment. Referring back to our assumption that IBM would have to take in $50 billion by 1995 to achieve its new growth goals, how much of that might come from acquisition activities?

If the percentage is 25%, IBM would have to find $12.5 billion in 1995; if 50%, $25 billion.

So who must IBM go after? Obviously, the big companies. This explains IBM's sizable investments (from 20% to 100%) in Intel Corp., MCI Communications Corp. and Rolm Corp.

MCI and Intel are both $2 billion firms. While IBM has taken a minority interest in these (as it once had with Rolm Corp.), it clearly has a future call to expand its interest in those companies.

The most interesting concept to contemplate in light of IBM's new strategies is the scenario whereby IBM forces its growth at a faster rate than the rest of the industry's.

One is reminded of the French forecasts of the early 1970s, when that (acknowledgedly often paranoid) country foresaw IBM soaking up the entire infrastructure of the data processing and communications worlds on the company's inexorable path to industry domination.

The view of the French then, which still rings somewhat true 15 years later, held that the trend of complexity, combined with severe shortages of qualified manpower, would make the job of implementing information processing systems too difficult for most firms to handle.

In any case, implementation would be exceedingly expensive, even for companies on the bleeding edge.

Viewing informational power as similar to electric power, the French foresaw that, in the long run, users would be disinterested in the hassles of implementation and would pay a premium to buy computing power from huge utilities.

But at that point, the only firm in a position to offer such an information power utility was IBM.

While IBM's Information Network Service (INS) did not exactly set the world on fire when it was announced, it was a first step in IBM moving back into the service business.

Through INS, IBM has been learning how to deliver a variety of solutions, such as information centers and development centers based on very high-function and complex architectures, directly to the end user.

While it is beyond the scope of my comments to delve into the probabilities of success for such utility practices, this activity should be understood as one piece in IBM's long-term diversification puzzle.

In general, one should view IBM's thirst for acquisitions in the broader context of its natural competitive inclinations to sop up as much of the basic industry demand for information horsepower as possible.

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'Can we sell you a mainframe?'

If IBM does not adequately and quickly address distributed processing, it may well miss the opportunity to grab a large piece of the end-user computing market. Ironically, the Personal Computer has been the major catalyst in this area.

By Francis Gens

Consider the following simple business problem: You are the chief executive officer of a major computer company that holds a near-monopoly of large-computer sales and achieves very high margins (80%).

To maintain growth and help smooth out revenue cyclically, your company diversified into other products, such as minicomputers and peripherals. However, large-computer sales continue to dominate revenue and, of course, earnings.

One day you are in a meeting, reviewing the company's growth strategy, when a vice-president from the minicomputer division notes that other minicomputer vendors are maintaining greater market share than your company, which has greater industry visibility, financial resources and technological muscle to throw at the market. And, he points out, "Who knows? With all the talk about distributed processing, the growth of the minicomputer market might rocket past that of large computers."

Here is the simple resource management problem:

- Do you pour a large amount of capital into broadening and improving your minicomputer products and marketing effort, knowing that competition is more vigorous and margins are substantially less, on the chance that volume will compensate for lower margins and a stronger product position in minicomputers may yield strategic benefit several years hence?
- Or do you continue to invest in the large-computer line, recognizing that its profitability and growth rate is sufficient to maintain earnings growth without the exposure that selling less profitable products against more skillful competitors would entail and adding in the risk that a successful minicomputer division might draw away demand for your large computers?

Crowd pleasers

If you were interested in maximizing growth and pleasing stockholders, you would probably do what IBM did during the rise of such companies as Digital Equipment Corp. and Data General Corp.: essentially limit involvement in the minicomputer/distributed processor market in favor of investing in a more profitable activity — selling mainframes.

During the past two to three years, however, IBM has invested heavily in the minicomputer "office automation" area. What has prompted the ever-prudent, financially sound computer giant to channel funds into what is, at this point, a less profitable business?

IBM is rapidly approaching the point at which the growth of the mainframe business (in dollars, not machine speed) will not keep up with IBM's growth requirements unless there are some changes in the application of mainframes — changes that acknowledge the existence of distributed processing.

In the past several years, a large part of IBM's incremental revenue growth has come from nonmainframe products, including its Personal Computer and program products. In the next four to five years, the growth of departmental systems promises to be very strong.

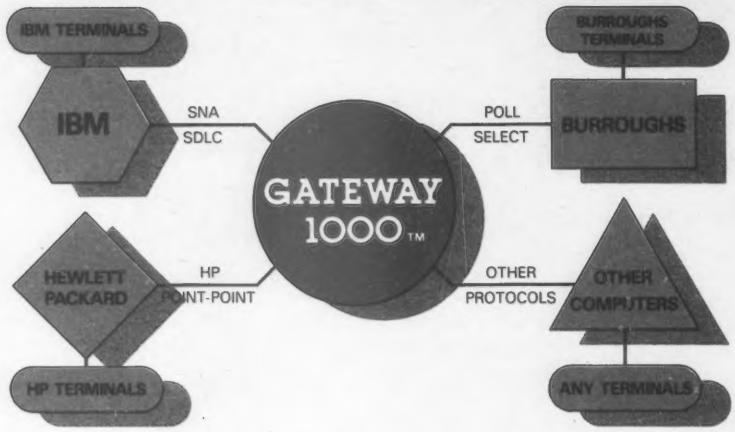
Many large corporations are now ready — with or without IBM — to implement corporatewide distributed processing systems (sometimes lumped together as "office automation" projects).

If IBM does not adequately and quickly address distributed processing, it may well miss the opportunity to grab a large piece of the end-user computing market. Ironically, the Personal Computer has been the major catalyst in this area, helping to create demand for departmental systems.

An about-face

Faced with an inadequate growth rate in the traditional mainframe market and an inexorable industry drive

Francis Gens is Director of the IBM Systems Advisory Service at International Data Corp., a market research and consulting firm in Framingham, Mass.



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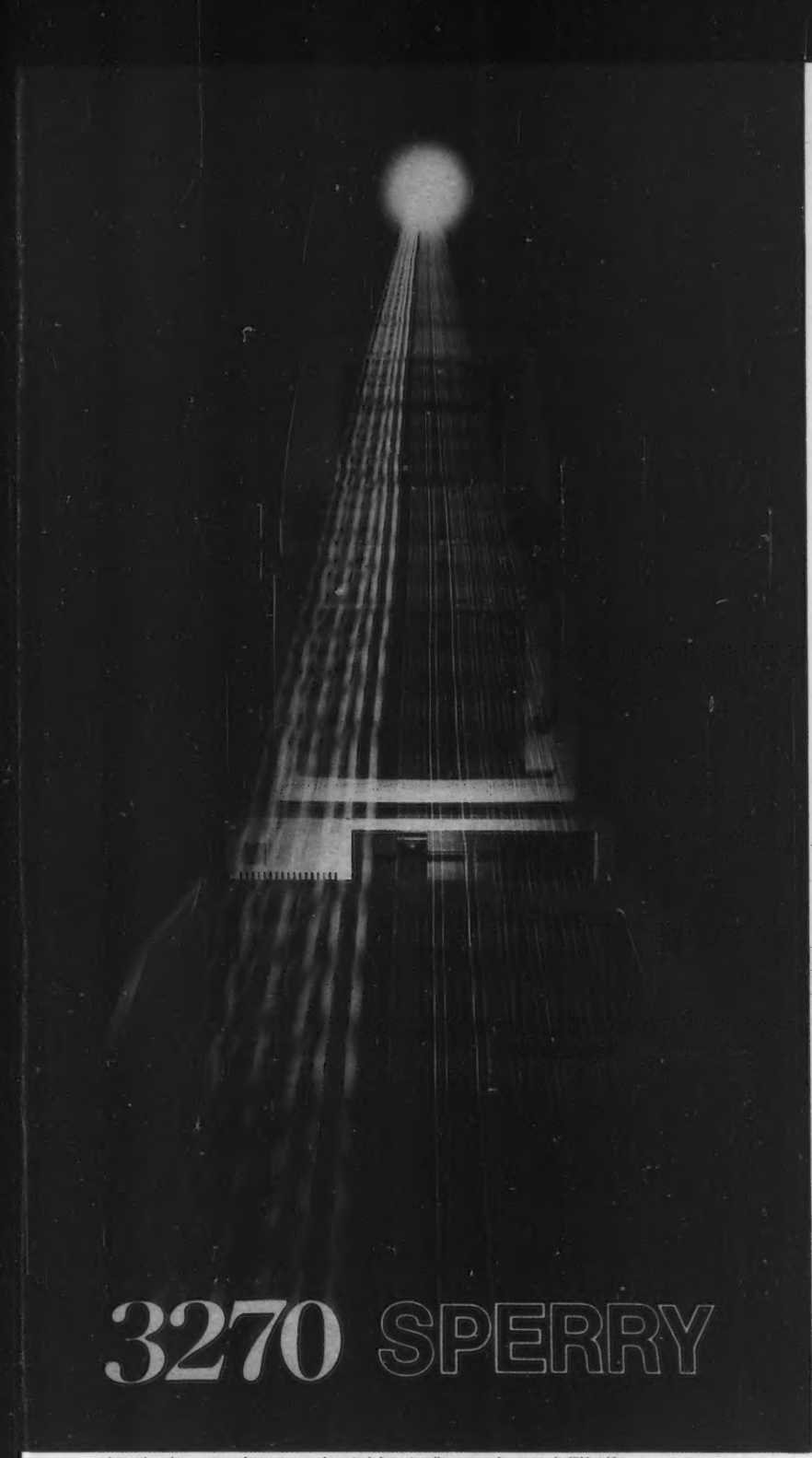

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toward distributed end-user computing, IBM has done an about-face and has begun to promote distributed processing. Not surprisingly, however, IBM's version of "distributed processing" is one that includes mainframes in a pivotal role — as providers of distributed processing services.

By establishing strong linkage between distributed processors and mainframes, IBM is attempting to hitch its relatively slow-growth but highly profitable mainframe business to the distributed processing market star. In the process, IBM also set industry standards — Systems Network Architecture (SNA), Distributed Office Support System (DISOSS) — for distributed processing networks, moving into the position of calling the tune for other vendors who attempt to sell distributed processors in large IBM accounts.

Critical to IBM's attempt to dominate the distributed processing market is the establishment of IBM-defined standards. IBM has a stranglehold on the mainframe market, owing to its control of the de facto 370 architecture and operating system standard. While IBM is not likely to dominate the actual distributed application environment so thoroughly, it is already on its way to controlling the communications links between distributed sites.

At the heart of IBM's distributed/mainframe linkage strategy are its SNA communications network control/diagnostics products. Virtually every large IBM account — including most of the largest corporations in the world — have installed at least one SNA-based network. Most such customers are committed to migrating existing multiple corporate networks into one coherent SNA network. Thus, SNA is emerging as the backbone for large corporations' networks.

The SNA standard

Most significantly, every major IBM competitor in the distributed processing market has accepted, if not endorsed, the SNA standard, and announced, at minimum, the ability to interface to the networks by 3270 SNA emulation.

As IBM introduces enhancements to SNA, such as non-host peer-to-peer communications (LU6.2), DEC, DG, Wang Laboratories, Inc. and AT&T are committed to following the leader.

With all distributed systems required to interface (either directly or indirectly) to mainframe-based SNA monitoring, control and diagnostic software, the more distributed systems added to the SNA nework, the more host resources required to support the network. This is the link IBM seeks to establish: For every distributed system added, there should be a concommitant increase in host computer speed required to support the distributed system.

Surely the amount of host resource required to monitor an SNA node does not come close to equaling the amount of processing resource in the distributed node; if this were so, distributed systems on an SNA network would be uneconomical. However, IBM will surely attempt to raise the host processor cost of distributed systems by layering many more mainframe-based distributed processing services on top of SNA networks. IBM's DISOSS is an excellent example of such a host-based service layered on top of SNA.

DISOSS — an IBM MVS program — provides document distribution and library services for distributed systems, including the System/36, Personal Computer and 8100 processor. DISOSS requires SNA software to perform its distribution functions. In fact, it uses IBM-defined architectural extensions to the SNA architecture, the Document Content Architecture (DCA) and the Document Interchange Architecture (DIA). In a sense, DISOSS provides a logical, application-oriented network that utilizes the SNA abilities to manage lower level network functions.

DISOSS' prominence

While DISOSS is still far from being as widely installed as SNA, it will emerge as the standard for communication of documents and electronic mail between multiple vendors' distributed systems and between non-IBM vendors' distributed systems and IBM hosts.

Some non-IBM vendors may actually use DISOSS to communicate between their own distributed systems in large IBM accounts. Indeed, both Wang and DEC already have introduced DISOSS interfaces for their office systems.

As a host-resource-intensive distributed processing service, DISOSS plays a role similar to SNA in tying mainframe growth to distributed processing network growth. And although IBM has indicated that some DISOSS-like services will eventually be provided for some IBM distributed systems, it is likely that IBM will enhance DISOSS with new features that still require its frequent use. Support of other forms of information (such as image, voice) and tighter integration with DB2 will be among these enhancements.

Data base access and management will be marketed as another mainframe-based distributed processing service. During the next several years,

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IBM will market DB2 as the central data base manager for its large accounts. Even with the introduction of distributed data base management systems from IBM and other vendors, IBM will continue to promote the maintenance of a central data base as either the primary repository or back-up to distributed data bases.

To support this position, it is very likely that DB2 will be enhanced to provide services unavailable at distributed sites, such as data distribution services and maintenance of a global data dictionary/directory. In fact, DB2 and DISOSS could be integrated to share directories and support storage and retrieval of voice, data, text, images and graphics.

Although no IBM competitor has announced support for the DB2 standard, some vendors, including DG and several independent DBMS vendors, have announced support for IBM's SQL, DB2's query language. Support of SQL by these vendors implies that they believe DB2 will be the corporate data base management system for many large IBM accounts.

IBM's success with SNA, DISOSS and DB2 (to a lesser extent thus far) points out several things:

- IBM is intent on linking mainframes to the growth of distributed processing, expanding the role of the mainframe beyond traditional DP production jobs to include distributed processing services.
- Critical to IBM's effort to link distributed and host systems is the establishment of IBM-defined standards, which put IBM "in the driver's seat" and keep IBM competitors back on their heels.
- IBM competitors and users are rushing to embrace IBM-defined distribution processing network standards; to wit, independent standards efforts have had limited success thus far.

These facts suggest that IBM's linkage approach to distributed processing is working thus far. How will its ability to call the shots in distributed processing networks affect its users and competitors?

Good news, bad news

The good news is that standards for implementing multivendor distributed networks are emerging quickly.

The bad news is that IBM controls most of the new standards.

The drawback of IBM-defined standards for IBM competitors is that whenever IBM introduces enhancements to the standards — such as LU6.2 definition, support of images in DISOSS — IBM typically is able to deliver support of the enhancements six months to several years before other vendors. In most cases, however, the disparity becomes an important factor in sales only to users who require the new support immediately — a rare situation.

The bad news for IBM customers is that IBM-defined standards lock users into implementing distributed processing IBM's way — which is not necessarily the most efficient nor the least expensive way.

The good news for both customers and competitors is that IBM's imposition of standards at least provides some common basis for implementing multivendor distributed processing networks.

Support of SQL by IBM's competitors implies that they believe DB2 will be the corporate data base management system for many large IBM accounts.

The IBM-defined standards in networking and messaging, document formats and data base query/manipulation — along with de jure standards such as the IEEE 802 local-area networking standards (to which IBM adheres) — will allow users to put together clear "connectivity checklists" for distributed/departmental systems.

The final bit of good news for users and competitors is that IBM's role in establishing standards does not by itself guarantee it a dominant position in distributed processing. Competition in the distributed processing market has been vigorous, and IBM will be unable to establish a single operating system standard in that market as it has done in the mainframe market. Indeed, the departmental processor market in five years will feature six or seven dominant operating systems, including the proprietary VM (IBM 370), SSX (IBM System/36), VMS (DEC), VS (Wang) and MPE (Hewlett-Packard Co.), plus Unix (AT&T and others).

From the IBM perspective, however, the most critical goal is not domination of the distributed processor market but tightening the link between all vendors' installed distributed system and IBM mainframes, since mainframes remain IBM's most profitable products. That goal appears to be well within IBM's reach.

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Comment

IBM, Rolm and MCI vs. AT&T

By Charles Carroll

The long-awaited corporate battle between IBM and AT&T has been joined. IBM, virtually unchallenged in the data processing arena, has stormed into AT&T's domain — communications.

IBM accelerated this confrontation for a number of reasons. Its management is keenly aware of the strategic importance of communications for attaining dominance in the information industry. IBM must make a strong showing in communications if it is to reach its stated objective of annual sales in excess of $100 billion by 1990.

Gaining account control

Furthermore, establishing a strong communications program is essential to account control, the keystone of IBM's marketing philosophy. IBM wants to make its move while AT&T is still shackled by divestiture-related constraints and regulatory controls.

IBM's Corporate Management Committee endorsed a strong move into the communications arena in the early 1970s, when communications technology limited the deployment of distributed data processing.

After years of substantial research and development, experience in the European market and the frustrations of its Satellite Business Systems and Mitel Corp. involvements, IBM realized the limited window of opportunity and elected to enter the communications arena in a big way — through acquisitions and investments.

With sizable investments in MCI Communications Corp. and Rolm Corp., IBM now possesses the components it needs to pursue total business account selling in the information management industry. The challenge is twofold: IBM must integrate these components into a cohesive organization and at the same time continue to introduce new products that will meet customers' insatiable need for increasingly sophisticated technology.

IBM faces a powerful adversary in AT&T, the dominant player in the communications arena. AT&T is acutely aware of the IBM challenge and is deploying technology to combat it.

The battle fronts

Let's look at the critical battle fronts. Business users divide their communications spending into two areas: equipment and usage. Businesses spend by far the most on usage, the segment where IBM is relying on its 18% investment in MCI's long-distance service.

MCI, the second largest long-distance supplier in the U.S., started out by selling private lines to businesses. But nonexistent profit margins and central-office switching limitations forced MCI to concentrate on the residential market.

IBM wants to make its move while AT&T is still shackled by divestiture-related constraints and regulatory controls.

As a result, MCI faces several obstacles as it turns to business sales. First, it must compete against AT&T's impressive array of network usage offerings for business — T1, Software Defined Network and the anticipated Integrated Services Digital Network — which all entice large users to rely exclusively on AT&T. This is AT&T's strongest area.

Second, MCI must solve service problems. Large-volume users are less tolerant of transmission quality difficulties than residential subscribers. Quality is especially important if large businesses are to use MCI facilities for data communications.

Squeezed tight

Third, MCI's profit margins are being squeezed between rising costs on the one hand and competitive pricing on the other. Expenditures for expansion and quality improvements, access charges, equal-access marketing and marketing to large users are all rising, while AT&T's decreasing long-distance rates and anticipated discount programs mean prices are dropping.

Fourth, MCI must strengthen its marketing force to provide the kind of value-added service the large users expect and have traditionally received from AT&T. Finally, MCI must capture more of the equal-access market.

The other battle front is in the equipment area, where IBM captured 7% of the installed private branch exchange (PBX) base in one day by acquiring Rolm. However, IBM/Rolm faces several challenges of its own.

Charles Carroll is vice-president of research at Eastern Management Group, Parsipanny, N.J., a research and consulting firm specializing in telecommunications and information systems.

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Comment

The first is technological. Rolm's CBX was introduced in 1975, and despite Rolm's stated position that the CBX remains on the cutting edge, some users perceive the switch as old technology. Given a typical PBX life cycle of five to seven years, Rolm, with a PBX that is 10 years old, is excluded from a growing segment of the market.

The general availability of the overdue Rolmbus 295 is critical to Rolm's continued success as a stopgap product in this market until the company introduces a new PBX. The Rolmbus 295 high-speed bus will enable the older switch to handle much higher capacities, so the Rolmbus is essential in the large-end market for the short term. Also, Rolm needs a new switch to integrate its products into IBM's Systems Network Architecture world.

Delaying Rolm's announcements

Second, merging the two companies' technologies and organizations is taking more time than expected. IBM's product approval cycle has delayed Rolm's product announcements. The delay in the introduction of Redwood, its low-end PBX, hurt Rolm's competitive position.

Third, Rolm must gain market share in the voice networking area. Rolmnet has not loosened AT&T's lock on this field, which is also limiting the sale of Rolm systems.

Fourth, the IBM/Rolm connection must strengthen Rolm's marketing to national accounts. National accounts have experienced uneven marketing attention from Rolm operating companies and distributors. Rolm's recent announcement of an expanded National Accounts Program, to take effect Jan. 1, represents one step in the right direction.

Fifth, and perhaps most important, Rolm's service problems must be resolved. In a recent study, the Eastern Management Group found that users rank Rolm's service third, behind AT&T and Northern Telecom, Inc. Marketing and service rank with networking services as critical to success with large users.

Meanwhile, AT&T's PBX push is gaining momentum. Recovering from a disappointing performance in 1984, AT&T will be the No. 1 shipper of new PBX lines in 1985. The AT&T System 75 low-end PBX met a strong reception, and its customer access terminal stands as the industry standard. AT&T continues to enjoy users' perception of it as a purveyor of first-class service.

Now IBM must offer value-added services to communications departments, which historically it has overlooked.

Despite projections of decreases in private-line networks, users are installing new electronic tandem networks. Finally, joint AT&T Information Systems/AT&T Communications marketing, recently authorized by the Federal Communications Commission, will strengthen the company's efforts in the PBX/network area once organizational issues are resolved.

IBM clearly has the desire and the components needed to compete; the company also has the financial resources. Doing battle successfully will be a question of resolving the challenges outlined above and developing an integrated strategy of marketing and servicing large accounts — not trivial tasks.

To market and service the information management industry well, IBM must develop specialized personnel. IBM excels at providing value-added services to data processing users in large companies. Now it must offer similar services to the communications departments, which historically it has overlooked.

Senior managers will decide

AT&T uses telecommuncations managers, who are largely Bell system alumni, to provide value-added service. While the communications giant's service has suffered from the Information Systems/Communications separation, the recent FCC joint-marketing ruling should reduce this limitation. The positioning battle will be fought finally at the users' senior management level. Both IBM and AT&T realize this particular battle's importance.

IBM must not underestimate its adversary. Like IBM, AT&T has the desire, the components and the financial resources to succeed. AT&T also enjoys more than a century of experience in the communications arena as well as legions of satisfied customers. AT&T will be an even stronger competitor when it is freed from the divestiture and regulatory shackles.

IBM has never faced as powerful a foe as AT&T and certainly not on its opponent's turf. Large-volume users will not discard AT&T to switch to Rolm and MCI products just because IBM joint-markets with them. End users will assess the offerings, strategies, marketing and service of the IBM/Rolm/MCI triumvirate; then they may try a pilot program of end-to-end service. Only if the pilots are successful will they implement IBM's systems — gradually.

The outcome of this confrontation is years away.

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ARMONK
a portrait of success

By whatever means you use to judge a corporation, IBM comes out on top. Yet the company's success inspires its greatest criticism.

By Harry Bunn

Often criticized but always admired, IBM has made itself the very model of a modern corporation.

Its revenue growth has kept pace with or outpaced that of the computer industry as a whole. The company's commitment to its customer base — demonstrated in outstanding postsales service — outshines most of its rivals in the information technology market and most other corporations of its size. IBM will fly representatives to a site for training or suggest application solutions tried by other customers. The attitude is important: IBM wants to ensure that its systems run.

IBM's social conscience also stands out, measured in charitable donations, environmental concerns and good citizenship. IBM consistently employs local labor forces and led in hiring disabled workers long before legislation required it.

From a business standpoint, the company flatly outsizes its rivals. IBM invests more in research and development each year ($4.2 billion in 1984) than the revenues of all but four of its competitors. A rule of thumb says that in a mature market, a corporation must reach a minimum of 15% of the market leader's share to operate by anything but a niche strategy. Besides IBM, only Digital Equipment Corp. can claim this success in the computer industry. AT&T qualifies if we include the entire information technology industry.

By whatever means you use to judge a corporation, IBM comes out on top. And yet, the company's success inspires its greatest criticism. Someone is always accusing IBM of being predatory. How did IBM attain such strength?

In the early days, IBM emphasized sales backed by customer training. The company also took great pains to ensure sound maintenance and courteous service for all its products. IBM still emphasizes these qualities in its sales and services branches.

On the other hand, few credit IBM with announcing revolutionary products. Even fewer say it pioneers new markets. The company prefers to travel the safe, evolutionary path and leaving the trailblazing to others. For example, when Apple Computer, Inc.'s first Apple came out, IBM watched and waited, moving in with the Personal Computer only after Apple developed the market to the point where demand was truly strong.

While waiting for markets to open up, IBM vigorously researches developing information technology markets throughout the world. The company's forecasts of economic conditions in specific areas turn out to be substantially accurate because its economists are arguably among the best in both the public and private sectors.

Accurate forecasting enables IBM to respond promptly to favorable market conditions. Normally, only small organizations can react quickly to a dynamic environment because they are entrepreneurial. In a firm of IBM's size, one would think reaction to change would resemble a supertanker changing course.

But in fact, through internal discipline, a well-formatted task force approach and a companywide commitment to achieve what's best for the corporation, IBM reacts quickly to market conditions.

In addition, IBM is its own largest and smartest customer. There is an adage that cobblers' children usually wear the poorest quality shoes in the village. It isn't so in Armonk, N.Y. The same internal commitment to seek the best for the company also encourages IBM to use its own state-of-the-art products throughout the organization.

IBM keeps telling its customers how to take full advantage of their systems. IBM's own managers are the best at taking this advice. In order to maintain its competitive advantage, IBM experts have developed a significant number of proprietary systems for its own use as well. For example, IBM performs logistical analysis to determine the most expedient manufacturing methods or locations, using logistics systems that are unknown to the rest of the industry.

IBM is as canny abroad as at home. With more than half the world computer market outside the U.S., IBM spends a considerable effort making a lasting and profitable impression in foreign countries. The company's gross income from operations outside the U.S. in 1984 totaled $18.6 billion, including manufacturing, research and development.

This success can be attributed to IBM's painstaking efforts to do as the local people do. The company recruits, trains and promotes the best local residents.

Michael Porter, noted Harvard Business School professor, cites IBM in *Competitive Strategy* (Free Press, New York, 1980) as an international marketing leader. He says "[IBM uses] local full employment, balanced intracompany transfers of goods among countries and local R&D as a key source for global competitive advantage."

Even IBM's great size and sound management do not ensure success, so the company

IBM 1984 revenue

Product	Revenue (dollars in millions)	% Total Revenue
370 series*	18,900	41.1
Series/3, 8100, Series/1*	3,200	7.0
Personal Computers*	4,700	10.2
Software	3,200	7.0
Maintenance	5,300	11.5
Federal systems	1,700	3.7
Office systems**	4,400	9.6
Other***	4,537	9.9
Total	**45,937**	**100.0**

*All system numbers include associated peripheral sales.
**Office systems include 5520s, Displaywriters, copiers and typewriters.
***Other includes supplies, services, application-unique terminals, communications equipment and other businesses.

Source: International Data Corp.

Harry Bunn is senior vice-president of PA Computers and Telecommunications, Princeton, N.J. PA provides consulting services internationally in all aspects of information technology.

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has undertaken strategic alliances. After continued disappointments trying to develop private-branch exchange products internally, IBM acquired Rolm Corp. IBM also entered the long-distance telecommunications and microprocessor industries through partnerships with MCI Corp. and Intel Corp.

IBM's stake in these companies forms part of its long-term strategies. IBM watches over its acquisitions, careful not to destroy their entrepreneurial spirit with oppressive control. But at any time, IBM may move to bring the acquisition into the fold.

The key point here is that IBM readily admits that it doesn't know all the answers and is prepared to go outside for products and expertise when the situation arises. Seeking outside expertise may help IBM avoid repeating certain mistakes, such as the PCjr.

Taking care of its own

In his book, *A Business and Its Beliefs*, former IBM Chairman of the Board Thomas J. Watson Jr. wrote, "We are convinced that any business needs its wild ducks. And at IBM, we try not to tame them." Though some outsiders claim otherwise, IBM actively promotes individual expression and creativity within its corporate structure.

The development of the IBM Personal Computer is a good example of promoting entrepreneurship. In 1980, Frank T. Cary, chairman of IBM's corporate management committee, had a request for William Lowe and Don Estridge — develop a personal computer. Both men were given the freedom to use all resources at their disposal, including non-IBM products, to develop an efficient, marketable machine.

And so they did. Estridge and Lowe set up and ran the Entry Systems Division, which Lowe still leads. Estridge built a very high-speed, low-cost system for personal computer production, using significant amounts of automated assembling to keep the cost down. The result became an industry-standard computer, proving that an entrepreneur can succeed in a large corporation, given the right circumstances.

As a whole, IBM does not encourage the fame of individuals in the external world. But internally, employees are recognized through morale-boosting in-house awards and

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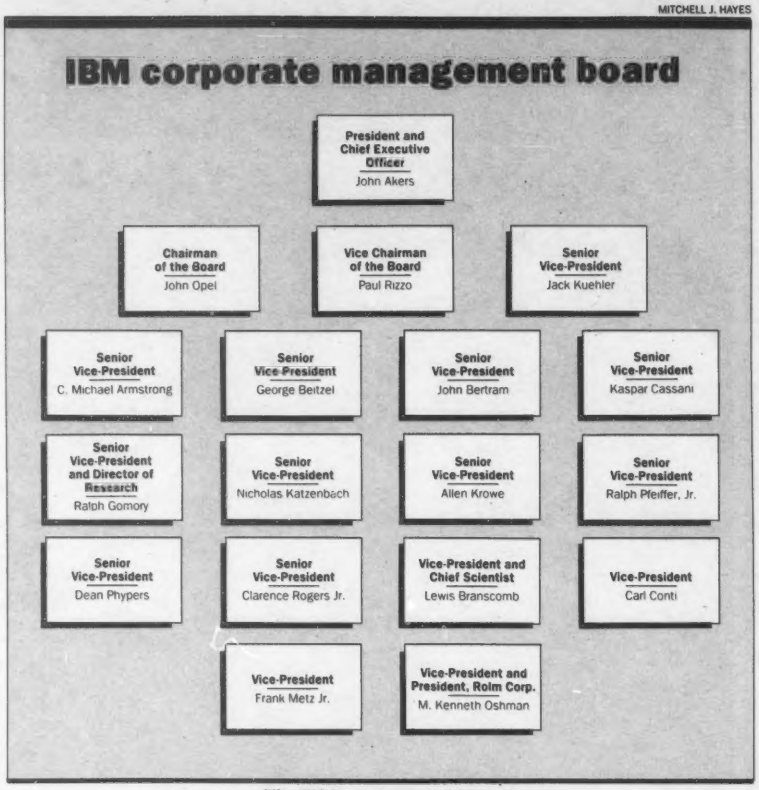

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companywide activities. IBM consistently has been cited by its own employees as one of the best companies for which to work. It provides educational summer camps for employees' children, hosts family dinners for everyone from the janitor on up and provides internal counseling and appraisal services to let workers know where they stand.

Policies go beyond a good benefits package. IBM finds meaningful positions for workers who "burn out" on the job rather than putting them out to pasture. The Open Door policy for rectifying employees' complaints remains as active as ever.

The information technology industry as a whole is entering maturity as the growth rate begins to slow. The 16% growth rate for 1984 will drop to 10% in 1985, reflecting an industrywide slump. The industry will rebound to a 15% growth level in 1986, but over the next five years, the rate will slowly diminish to stick at 12%.

If IBM can keep pace with the computer industry, its revenues will top $139 billion by 1991.

IBM corporate headquarters, Armonk, N.Y.

IBM does not encourage the fame of individuals in the external world. But it consistently has been cited by its employees as one of the best companies for which to work.

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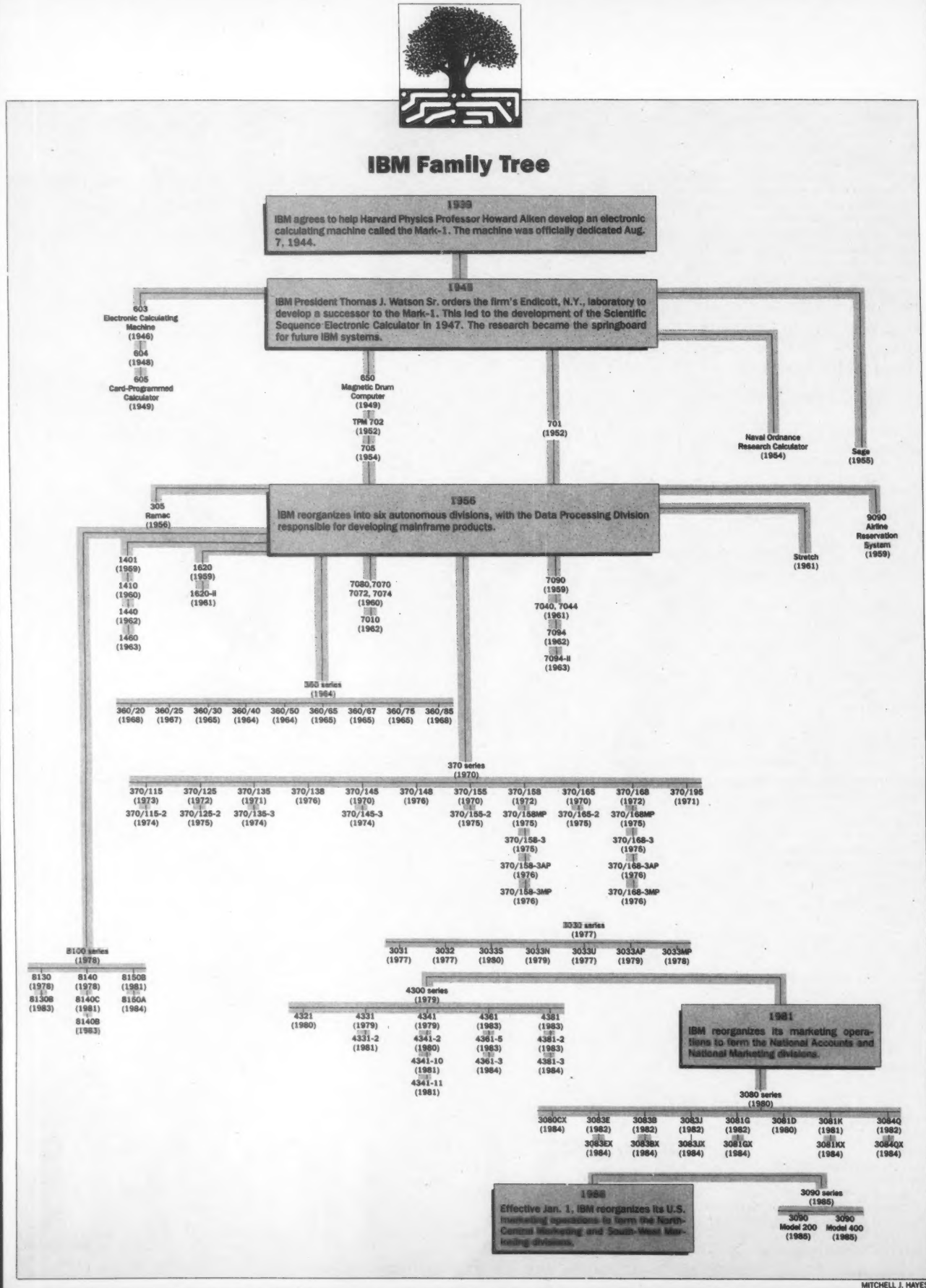

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IBM'S EARLY COMPUTERS

IBM's early response to computers was convincing, and by late 1955, Tom Watson Jr. could breathe a sigh of relief: His large-scale computers were leading Remington Rand's in installations.

By Charles Bashe, Lyle Johnson, John Palmer and Emerson Pugh

Until 1946, when IBM announced its Type 603 electronic multiplier, an electromechanical technology had sufficed for the company's products. Much of this technology was rooted in the distant past; IBM's inventors, draftsmen, modelmakers and machinists — and even the specialists who helped them in chemical and electrical design — had been dealing with slowly accumulating bodies of knowledge.

But the vacuum tube, which until World War II was considered essentially a communications device, had been pressed into service for military applications, and the data processing industry had suddenly become susceptible to a higher rate of technological change. The prospects for change were considerably heightened by the 1945 conception of the stored program.

Although by 1946 IBM was already designing the Selective Sequence Electronic Calculator (SSEC) in Endicott, N.Y., and establishing a small electronics activity in Poughkeepsie, N.Y., the company was far from ready for abrupt technological change. Thomas J. Watson Sr. and his staff had never been forced to come to grips with close relationships between science and technology. As a result, they tended to emphasize the broad social benefits of science rather than specific applications to product technologies.

Moreover, the traditional IBM views concerning patent policy and product secrecy needed overhauling in America's postwar society, where the government was becoming increasingly disposed to support computer development in university, national and private laboratories.

Watson had built a company with an exceptional record for customer service and employee loyalty. It is noteworthy that Ralph Palmer and a number of other engineers returned to IBM after having tasted the excitement of wartime electronics. Watson put together an excellent manufacturing organization, and his product development laboratories improved punched-card machinery. Most important, he created a company with a rare unity of purpose; he and his managers were completely preoccupied with data processing.

COURTESY OF IBM

By capitalizing on old strengths while gradually developing new ones, IBM adjusted to electronics and the stored program from 1946 to 1955. Well before the end of the period, most of its engineering activities had been redirected toward computer systems. Computer production increased between 1956 and 1961, even though the growing revenues from electronic accounting machine (EAM) products exceeded those from computer systems.

Adjusting to new technology

IBM took its first significant commercial steps into the era of electronics with the pluggable vacuum tube circuit and announcement of the 604 electronic calculator. The first step, taken in 1948, was a modest one, but it met a widespread customer need and provided experience in designing, manufacturing and servicing vacuum tube machines. The 604 preserved product continuity and bolstered an already successful line.

The critical matters for advanced development, those upon which its effectiveness largely rested, concerned the choice of components to be pursued seriously, the excellence of the components finally obtained and the availability of challenging commitments. Much depended on these matters. Among the most successful components were the vacuum-column tape unit, current-switch circuits, mass-produced ferrite-core memories, Ramac disk file, slider disk file, chain printer and removable disk pack.

IBM's determination to learn by making bold commitments led to the Defense Calculator, Norc, Sage, Fortran, Stretch, Harvest and Sabre projects — to

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mention only major ones. Each involved risks of one kind or another, a good deal of technical and managerial effort and the support of high-placed management.

The diverse technological benefits that resulted defy a summary, but all of the projects added to the number of trained IBM engineers and programmers.

The challenges presented by such undertakings aided greatly in recruiting technical people who otherwise would have been deterred by the pervasive view that IBM, as a respected but conservative supplier of punch-card machines, had little appetite for advanced technology.

In the electromechanical era, design engineers had gained professional recognition through their patents, and business-machine companies had relied heavily on patent protection.

The challenges presented by such undertakings aided recruiting technical people who otherwise would have been deterred by the pervasive view that IBM, as a respected but conservative supplier of punch-card machines, had little appetite for advanced technology.

These circumstances, coupled with the senior Watson's penchant for dealing directly with his engineers, fostered an atmosphere of secrecy within the Endicott laboratory.

This IBM tradition of secrecy and patent protection was antagonistic initially to any acceptance of government funding for advanced development. But by 1949, the tradition was being eroded by the influx of electronics engineers and other technical personnel.

In the dynamic field of electronics, scientific information was shared at professional meetings, and the pace of technological change reduced the scope of proprietary information.

The concurrent rise of solid-state physics, with its heavy demands for research and development funds, ended the tradition. By 1954, IBM avidly sought government development contracts, as did its competitors, attempting to defray the rising cost of advanced development.

Internal funding

Even after IBM's attitude toward outside funding changed, most of the company's successful advances in components and automated manufacturing were internally funded.

Skills previously used in developing electromechanical punch-card equipment were applied, with remarkable success, to speed up the tasks of handling, testing and wiring the thousands of ferrite cores used in memory arrays.

Later, IBM built the first fully automatic production line for transistors and developed many techniques for efficiently manufacturing the Standard Modular System (SMS) cards and circuits that until 1964 remained the company's primary solid-state computer components.

The changing environment

While IBM was taking its first lessons in technological change and tentatively forging policies for dealing with it, the business environment also was changing.

First, the U.S. postwar perception of a Soviet threat was followed by heavy emphasis on research and development in ballistics, nuclear physics, aerodynamics and related technical fields.

This focus in turn led to mounting interest in faster computation and in stored-program computers on the part of universities and national laboratories, to the convening of influential technical conferences and to the formation of professional groups concerned with computers.

Second, a large-scale computer known as the Univac, designed by the Eckert-Mauchly Computer Corp. (EMCC) and partially funded by a government contract for three units, was accepted by the U.S. Bureau of the Census in 1951.

The vendor was Remington Rand, Inc., which had absorbed EMCC the previous year. Census personnel, who were relying on Univac for help with the 1950 census, operated the system in the factory for nearly two years to postpone the substantial downtime of a move.

Univac, a computer with a thousand words of delay-line memory, had been heralded for years, and its availability signaled the beginning of an era of commercially available computers.

After falling behind in the punch-card machine market, Remington Rand acquired in Univac an automatic system that was capable of displacing a whole installation of punch-card machines as well as most of the operators required for carrying card decks from machine to machine.

Since census taking stands as a prominent symbol of nontechnical data processing, the bureau's acceptance of a Univac soon began

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Here's how The Honeywell Office can help you manage and direct your information resources more efficiently.

Honeywell ties PC processing and terminals into one departmental system.

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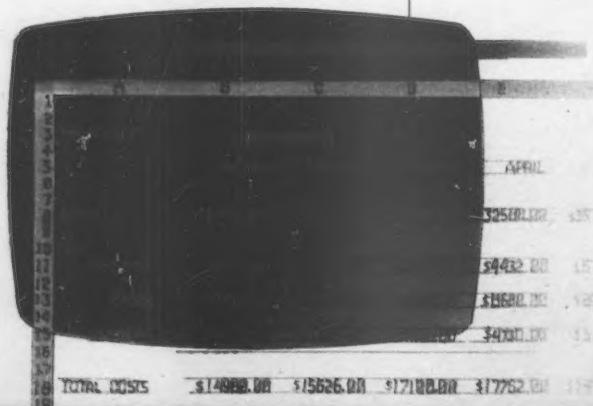

But we didn't stop there.

We integrated decision support tools and distributed networking capabilities so that your departments can transfer, share, and combine office and data processing information with simple commands. Without unnecessary steps. Without costly duplication of efforts.

InfoCalc, our integrated spreadsheet, lets managers access information from the department across the country as easily as the sales office from across the corridor.

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So now your accounting, marketing, and other departments can access and control their information.

	HONEYWELL	WANG	IBM
	The Honeywell Office*	OIS/VS	IBM 36/ IBM 5520
• Compatible Product Line	Yes	No	No
• Consistent User Interface	Yes	No	No
• Integrated Word & Data Processing	Yes	VS Only	Limited
• Full Office Processing Capabilities	Yes	VS Only	Limited
• Integrated Spread Sheet	Yes	No	No
• Easy to Use Programming Tools	Yes	VS Only	No
• Query & Report Facility	Yes	VS Only	Limited
• Data Entry Facility	Yes	Limited	Yes
• User Application Interface	Yes	Limited	Yes
• X.25 Networking	Yes	VS Only	Yes
• SNA Networking	Yes	VS Only	Yes
• Exceeds ISO Networking Standards	Yes	No	No
• Electronic Mail—Peer to Peer	Yes	Limited	No

*Over 2000 installations.

And when it comes to writing new applications, we offer a full complement of programming languages that include BASIC, COBOL, FORTRAN, ASSEMBLY, ADA, C, RPG, and PASCAL.

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Honeywell.

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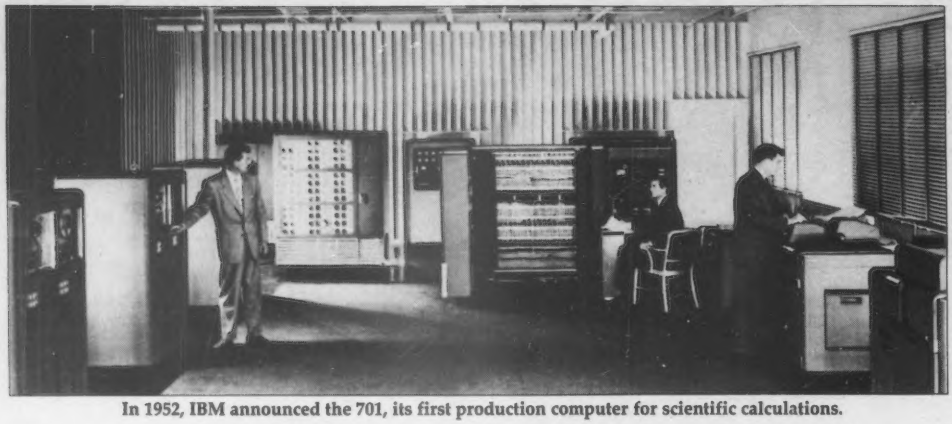

In 1952, IBM announced the 701, its first production computer for scientific calculations.

changing the public view of the electronic computer as a laboratory curiosity.

The thought of performing applications in a better way began to catch the interest of methods supervisors in large corporations everywhere. They could foresee possibilities for improved data processing services, even though the cost reduction attainable in replacing punched-card machines with large-scale computer systems was often debatable.

Within IBM, the result was a tug-of-war between computer and card-machine advocates concerning the true needs of the marketplace.

As the tide slowly turned toward the use of computers, the period from 1952 to 1955 became one of great tension for IBM engineers, executives and salesmen. The company's initial computer, the 701, first delivered about two years after Census accepted the first Univac, was designed for mathematical applications. IBM's direct response to the Univac, the accounting-oriented IBM 702, was delivered four years after the Census Bureau had accepted a Univac.

The future of DP came to be perceived, within IBM and elsewhere, as heavily dependent upon large computers and magnetic-tape units.

Despite the gratifying early sales of the relatively small IBM 650 computer, first sold in 1954, the future of the data processing industry came to be perceived, within IBM and elsewhere, as heavily dependent upon large computers and magnetic-tape units.

Success causes suit

Remingtom Rand management presumably viewed its acquisition of EMCC — and in 1952 of Engineering Research Associates (ERA), a company whose computer soon vied directly with the IBM 701 — as the best way to recover from a product-line weakness caused by Remington Rand's lapse in fielding a counterpart to the IBM 604 electronic calculator.

In fact, IBM's degree of success with card machines led the U.S. Department of Justice in 1952 to sue the company for monopolizing the punched-card accounting machine industry, an action that ended with a 1956 consent decree under which IBM agreed to sell (as well as rent) its machines and to license certain data processing patents at reasonable royalties and certain card-machinery patents without charge.

At this time, IBM adopted the policy of making all patents pertaining to the manufacture, sale and use of data processing equipment available at reasonable fees.

Under this policy, the company's patent portfolio merely assured freedom of action, while product superiority was to be achieved by using all available knowledge rather than excluding competitors from patents.

By an ironic twist, the 1952 to early

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The Right Printers for the Right Computer Systems

1956 duration of the antitrust action corresponded closely with a period during which the highly visible presence of Univacs prompted some industry observers to speculate about the possible eclipse of IBM by Remington Rand.

But in acquiring pioneering computer products, Remington Rand executives had also acquired formidable marketing problems. At the time, experience upon which to estimate ultimate customer receptiveness was nonexistent.

After the first Univac was accepted in 1951, Univac deliveries curved as follows: 1952, three; 1953, three; 1954, seven; 1955, seven; 1956, 15; 1957, six; and 1958, one.

Although these numbers were augmented by less-publicized deliveries of ERA-developed scientific computers, they well indicate the early hesitancy in the marketplace.

Lulled into security

Perhaps Remington Rand management was beguiled by the extraordinary public acclaim accorded to Univac (eventually called Univac I), but much of the initial acclaim was based more on awe and curiosity than on readiness to buy.

During the initial years of the Univac challenge, IBM's Card-Programmed Calculator (CPC), based on the 604, served much of the nation's need for computational equipment. The presence of the CPC was helpful in showing IBM's comprehension of the pervasive role that data processing was to play.

Then, in 1953, deliveries of a production run of 19 701s began. In late 1954, the completion of the superspeed NORC (Naval Ordnance Research Calculator) provided additional evidence of IBM's technical capabilities. IBM's commitment to the future of computers was further demonstrated in mundane, but telling ways.

For example, IBM computer products were designed as units that could pass through standard doorways, thereby ensuring that they could be installed conveniently.

Moreover, before the company delivered the first 702 system, it had programmed its Poughkeepsie, N.Y.-area payroll and a number of other applications; by early 1955, prospective customers could watch an IBM payroll being run on a 702.

By late 1955, Tom Watson Jr. could breathe a sigh of relief: His large-scale computers were leading Remington Rand's in installations, and the company he managed had weathered a challenge.

Meanwhile, in 1954, IBM announced the performance-enhanced, core-memory 704 and 705 systems as successors to the 701 and 702.

IBM's coordinated response to computers was convincing, and by late 1955, Tom Watson Jr. could breathe a sigh of relief: His large-scale computers were leading those built by Remington Rand in installations, and the company he managed had apparently weathered a critical challenge.

Coping with growth

In the first half of the 1950s, IBM experienced rapid growth as a result of defense programs and brisk EAM sales. By 1956, continuing growth seemed assured by mounting orders for computers. As a result, the corporate offices were overloaded with responsibilities, and the burdens were increasing.

After careful study, a thorough reorganization was undertaken in late 1956. Some new divisions were created, and many divisional responsibilities were realigned. Responsibilities were also clarified, thus decentralized.

Aside from a class of important decisions reserved for corporate headquarters, divisions became free to conduct their affairs under guidelines provided by the written policies of a watchful corporate staff.

The resultant organization gave the Data Processing Division (DPD) responsibility for developing, manufacturing and marketing EAM and computer product lines. Because DPD's success was measured in revenue growth, actions naturally keyed on

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the short run, with heavy emphasis placed on system improvement and embellishment and on programming aids that might increase the appeal of revenue-producing products.

These tactics proved successful in terms of sales, but they also contributed to the untidiness of a product line that already contained several computers of divergent design.

As a result of DPD's growth, another company-wide realignment of responsibilities and resources occurred in May 1959. This reorganization, which among other things carved the General Products Division (GPD) and the Data Systems Division (DSD) out of DPD, was an additional step in the direction set in 1956.

The 701 designers stressed arithmetic speed, the 702 designers stressed character-handling convenience and the 650 designers low manufacturing cost. Once the pattern of diversity was set, other distinctive systems followed.

As Tom Watson Jr. said, "The management concept is decentralization, wherein more of the responsibility for key decision making and for profit is set at operating levels below corporate headquarters." The boundary between GPD and DSD products was loosely understood in terms of rental pricing levels, with systems renting at $10,000 or more per month assigned to DSD and those renting for below that figure assigned to GPD.

As explained by the company's newsweekly: "The General Products Division is responsible for all product planning, development and manufacture of equipment presently represented by the punched-card, Random Access Method of Accounting and Control (RAMAC) and 650 class. The Data Systems Division does the same for equipment in the 700-series class and up."

The new alignment motivated the product divisions to plan and design computers of long useful lives rather than to opt for the quickest means of exploiting every opportunity sighted by the marketing organization (the surviving Data Processing Division). But it did not preclude inter-divisional quarreling over the middle ground — often the most lucrative region of the market — and it did little to reduce proliferation of dissimilar families.

Product diversity

IBM's first three marketable computers — the 701, 650 and 702 — exhibited little kinship in their instruction sets and data formats. The engineers who championed these computers were influenced by differing backgrounds and were forced by the high costs of hardware to warp their designs toward specific customer needs and device characteristics.

The 701 designers stressed arithmetic speed, the 702 designers character-handling convenience and the 650 designers low manufacturing cost. Once the pattern of diversity was set, other distinctive systems followed.

At an early stage, Stretch planners argued for a unified product family, emphasizing potential saving in hardware development and manufacture. These were sound reasons, but potential saving in program development later proved to be far more compelling. The Stretch planners also foresaw the value of being able to expand a customer's installation without serious disruption, but this argument did little to advance their case because other planners found little difficulty in developing feasible growth paths for 704 users (to the 709 and 8090) and 705 users (to the 705II, 705III and 7080).

By September 1960, just two years after announcing its first transistor computer, IBM featured eight solid-state computers in its sales catalog. In order of announcement date, these were the 7070, 7090, 1401, 1620, 7080, 7030 (Stretch), 7074 and 1410. The last two provided a measure of compatibility, in that programs written for the 1401 could be run on the more powerful 1410 and programs written for the 7070 could be run on the faster 7074. But among the first six, none could execute a program written for another.

Moreover, the development plans of the laboratories were fostering future diversity. Of particular concern was the preoccupation of GPD and DSD with new mid-size computers. While GPD's 1410

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— planned long before the divisional split and announced a year after — could be configured below the $10,000 per month rental line, typical 1410 configurations were priced well up within the DSD range.

In fact, prior to its September 1960 announcement, the 1410 was challenged by a DSD design — the 70AB.

The 8000 plan

Meanwhile, DSD Poughkeepsie, N.Y. was developing an "8000 series," a computer family intended not only to supplant all DSD computers but, circumstances permitting, to supplant the GPD product line.

Considerably conditioned by pleas from the sales force for immediate responses to the need for a more dollar-worthy product line, the plan for the 8000 series was somewhat shortsighted. To permit announcement of the 8106 in mid-1961, DSD had ruled out significant improvements in circuit technology.

Thus, the planned series would be making its debut as another line of SMS products, although the company had by then begun developing a form of integrated circuits and packaging.

Furthermore, a full solution to compatibility was lacking. Some machines were to be word organized and others to operate on characters, and

'If all our customers were able to interchange program information, progress would be even more rapid than it is.'

economy was to be served by varying the instruction sets.

In February 1960, John McPherson dusted off a year-old memorandum that he had circulated within corporate headquarters. It recommended a unified product line. Sending a new version to C. R. De Carlo, DSD assistant general manager, he noted, "The amount of common knowledge which has to exist to use stored-program data processing machines is so great that I feel we need the advantage of a single system that makes a single community of all our customers.

"If all our customers today were able to interchange program information, the progress in programming would be even more rapid than it is, and our contributions to programming could be much more significant and more widely useful."

Incompatibility

McPherson was well aware that customer data processing managers with two or more kinds of IBM computers were encountering formidable obstacles to optimal resource allocation.

Among the biggest obstacles were a proliferation of incompatible program libraries and of differing personnel-training requirements. Programmers and computer operators suffered a temporary but substantial loss of productivity in reassignments that moved them from one computer family to another.

'The common knowledge which has to exist to use stored-program data processing machines is so great that we need the advantage of a single system which makes a single community of all our customers.'

The more an organization came to depend upon computers, the more obvious such inefficiencies became. The most critical problem for IBM nevertheless lay in the huge task of developing and upgrading system programs and general-purpose routines of the kinds desired by users.

By supporting half a dozen computer families, IBM was reducing its capacity for advanced work on programming technology. And improvements in programming technology had been clearly recognized as necessary counterparts to technological improvements in hardware components. Improvements in both technologies were important to the continued growth of the computer industry.

IBM set about analyzing the problems in creating a unified line that would benefit from recent advances in transistor circuit technology. Obviously, several disparate needs had to be reconciled in the design of the new line.

Architectural considerations

First, the prevalent distinction between computers for science and computers for accounting needed to be erased because, as the variety of applications and operating modes widened, more computer installations needed capabilities for both floating-point arithmetic and character-handling convenience.

Second, core-memory technology was continuing to enhance the prospects for larger memories — much to the satisfaction of customers, whose

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The models might differ in design and construction but all should present the same outward aspect to a user. The family of computers that resulted was the IBM 360 series.

requirements for larger memories were steadily increasing. This meant that the computer programs of the future would have to address much larger memories.

The need for longer addresses, which was already stretching instruction formats in large computers, obviously posed serious problems for anyone proposing to reconcile the addressing structure of more powerful computers with that of small computers.

Third, the six-bit character sets in use were becoming an intolerable limitation that barred the use of both uppercase and lowercase alphabets and of suitable variety in special symbols.

Fourth, the increasing variety of attachment methods for I/O units had become a hindrance to the design of optimal hardware and software.

The possiblity of standardized I/O interfaces had received considerable attention in the design of Stretch.

Radical design

These needs and others related to promising new modes of computer operations and maintenance made it clear that the hypothetical product line would have to constitute a radical departure in design.

Moreover, the effort as a whole would shake the entire corporation as never before. Attitudes toward computer design would have to be changed, as would the provincial attitudes of divisional management.

So vast an undertaking would require the concerted effort of everyone in the company.

In November 1961, as a way of indicating the seriousness of the task and of mobilizing technical know-how and support, a companywide task force called Spread was convened.

The 13 task force members worked for about 60 days and produced a final report on Dec. 28, 1961.

In essence, the report recommended that IBM create a compatible family of computer models spanning an unprecedented range of performance. The models might differ in design and construction as well as in price and performance, but all should present the same outward aspect to a user. In other words, they should share a common computer architecture. The family of computers that resulted was announced in April 1964 as the IBM 360 series.

When Tom Watson Jr., became president of IBM in 1952, EAM products and electric typewriters were the company's major sources of revenue. Revenue from computer products was nil.

In 1962, the company's U.S.-based annual revenue from computer products reached $1 billion and for the first time surpassed the corresponding revenue from EAM products.

In the course of a decade, the data processing industry had relied heavily upon vacuum tubes and then had gone about replacing the tubes with solid-state devices.

Storage had come to include various kinds of new devices, among them ferrite-core memory units and direct-access magnetic disk files.

Software technology had produced compilers, operating systems and various other programs intended to facilitate the programmer's task or contribute to more efficient computer operations.

The computer company

IBM's organization had changed dramatically and instituted a large, clearly delineated research activity, with several laboratories equipped for exploring future technologies.

During the decade, the growth prospects for electronic computers also had attracted many entrants to the data processing industry. By 1962, Remington Rand and IBM were competing with many firms, among them General Electric, RCA, Philco, Burroughs, NCR, Honeywell and Control Data Corp.

After suffering from the malady of complacency for a time following World War II, IBM management had confronted the existence of stored-program electronic computers and had undertaken the technolgical buildup essential to a rapid transformation of the IBM product line.

Then, in the course of satisfying a wide variety of specific customer requirements, the firm had become a computer company, finding itself at the forefront of an unusually dynamic industry.

Not only was technology advancing rapidly, but customer requirements were dictating greater unity in computer architecture. An early phase of the computer era was closing, and the manner in which IBM would respond to the Spread report was destined to influence profoundly the company's future.

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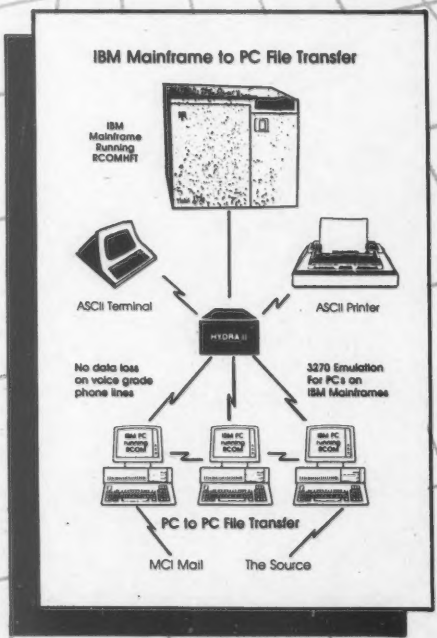
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Wild ducks, corporate picnics, the open door — Thomas Watson Jr. remembers his father, IBM's legendary T. J. Watson Sr., and the beliefs that built a company.

A business and its beliefs

By Thomas J. Watson Jr.

IBM's philosophy is largely contained in three simple beliefs.

I want to begin with what I think is the most important: *our respect for the individual.* This is a simple concept, but in IBM it occupies a major portion of management time. We devote more effort to it than anything else.

This belief was bone-deep in my father. Some people who start out in modest circumstances have a certain contempt for the average man when they are able to rise above him. Others, by the time they become leaders, have built up a unique respect and understanding for the average man and a sympathy for his problems. They recognize that in a modern industrial nation, the less fortunate often are victims of forces not wholly within their own control. This attitude forms the basis for many of the decisions they make having to do with people.

T. J. Watson was in the latter category. He had known hard times, hard work and unemployment himself, and he always had understanding for the problems of the working man. Moreover, he recognized that the greatest of these problems was job security.

* * *

Our early emphasis on human relations was not motivated by altruism but by the simple belief that if we respected our people and helped them to respect themselves, the company would make the most profit.

Our management also recognized that the individual has his own problems, ambitions, abilities, frustrations and goals. We wanted to be certain that no one got lost in the organization and, most of all, that no individual became a victim of any manager's unfairness or personal whim. In this regard, we developed what we call our "Open Door" policy. This is a key element in our employee relations.

The Open Door grew out of T. J. Watson's close and frequent association with individuals in the plant and field offices. It became a natural thing for them to bring their problems to him, and in time, it was established as a regular procedure. My father encouraged this in his visits. He spoke of it in his telephone broadcasts to offices and plants. If a man was not getting along or if he thought he was being treated unfairly by his manager, he was told to go to the plant or branch manager. If that did not work, he was then invited to come and lay his case before my father.

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Hundreds of employees literally did just that. Many would take the day off from our plant in Endicott, N.Y., and come to his office in New York to talk about their problems. More often than not, he favored the complaining employee — sometimes, I'm sure, more than he should have. But he built up a lasting relationship with a great many employees, and they helped him to keep in touch with what was going on in the company. At the time of his death in 1956, most of our then-57,000 employees thought of T. J. Watson as a friend they could count on.

The open door

The Open Door exists today as it did then. I'm sure that a policy of this kind makes many a traditional manager's blood run cold. He probably sees it as a challenge to his authority or, worse yet, as a sharp sword hanging over his head. But the fact remains that in IBM, it has been remarkably effective, primarily because — by its mere existence — it exercises a moderating influence on management. Whenever a manager makes a decision affecting one of his people, he knows that he may be held accountable to higher management for the fairness of that decision.

Years ago we ran an ad that said simply, "IBM Means Service."... It stated exactly what we stand for: We want to give the best customer service of any company in the world.

From time to time, we have had second thoughts on the practicality of this policy, especially now that IBM has grown to a company of more than 80,000 people in the U.S. alone. Obviously, if everyone with a problem insisted on seeing the president or me, we would both have run out of time long ago.

The answer, in the future, may have to come in a shift downward in this court of appeal, possibly to the level of division president or general manager. But whatever the difficulties, we certainly have no intention of denying anyone the opportunity to talk to whomever he wishes to in this business. Whether they exercise it or not, our people are reassured by the fact that they have this right. And by its existence, I believe it acts as a deterrent to the possible abuse of managerial power.

* * *

It is interesting to contemplate the possible nature of individual achievement in the absence of large organizations. It probably would be of a different order. The challenges in a large organization are great, and achievement, really, is the successful response to challenge. Men who have accomplished great deeds in large organizations might have done less if they had been challenged with less, and they would have realized less of their potential and their individuality.

In IBM, we frequently refer to our need for "wild ducks." The moral is drawn from a story by the Danish philosopher, Soren Kierkegaard. He told of a man on the coast of Zealand who liked to watch the wild ducks fly south in great flocks each fall. Out of charity, he took to putting feed for them in a nearby pond. After a while, some of the ducks no longer bothered to fly south: they wintered in Denmark on what he fed them.

In time, they flew less and less. When the wild ducks returned, the others would circle up to greet them but then head back to their feeding grounds on the pond. After three or four years, they grew so lazy and fat that they found it difficult to fly at all.

Kierkegaard drew his point — you can make wild ducks tame, but you can never make tame ducks wild again. One might also add that the duck who is tamed will never go anywhere any more.

We are convinced that any business needs its wild ducks. And in IBM we try not to tame them.

Service and superiority

Years ago we ran an ad that said simply and in bold type, "IBM Means Service." I have often thought it our very best ad. It stated clearly just exactly what we stand for. It also is a succinct expression of our second basic corporate belief. *We want to give the best customer service of any company in the world.*

We recognize that service is the key element in what I hope is our good reputation. T. J. Watson realized early the great importance of reputation. When he was 18, he drove a horse and buggy across northern New York state selling pianos and sewing machines. His customers were farmers, and like farmers everywhere at the time, they seldom had much cash. To make a sale, he frequently took animals or farm equipment in trade, later selling them off in Painted Post, his home base.

He had two years of good training in how to get along with people, how to make a fair trade and leave people happy. As he drove his team through

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the countryside the second time, he saw at once the value of the golden rule in business, for many people would buy his goods on the basis of what satisfied customers had to say about his products.

Cultivating the sales force

IBM's sales and service forces bear the prime responsibility for our rigid insistence on service. To maintain our reputation for excellent service, we long ago established high standards for the selection of salesmen and customer engineers.

To attract top-quality salesmen, IBM used sales commissions, advances, quotas and guaranteed territories at a time when most of those practices were still looked upon as innovations. Schools were set up for salesmen — the training course now runs as long as 18 months — and we began to visit colleges to recruit our sales trainees.

Equal care was taken in the selection and training of customer engineers. With high-speed electronic equipment and large systems installations, the job requirements have since become so demanding that we interview an average of 25 applicants for each one we hire.

In its commitment to customer service, IBM learned that the best way to serve a prospect was to provide equipment adapted to his requirements rather than ask him to alter his business to fit our machines.

We found that good service to the customer requires the cooperation of all parts of the business. I think this was brought home to us years ago when we centered many of our activities on our plant in Endicott.

Sales and customer engineering schools were located there, as were our sales conventions in the 1940s. Customer executives and administrative personnel also visited and stuided at Endicott. This arrangement brought together all our people as well as our customers and made it possible for us to give the latter better serivce as we learned more about their problems.

In a business like ours, a reputation for service is one of the company's principal assets. Many operations performed by our machines are vital to the customer's business. Lengthy breakdowns could be ruinous.

* * *

The third IBM belief is really the force that makes the other two effective. *We believe that an organization should pursue all tasks with the idea that they can be accomplished in a superior fashion.* IBM expects and demands superior performance from its people in whatever they do.

I suppose a belief of this kind conjures up a mania for perfection and all the psychological horrors that go with it. Admittedly, a perfectionist is seldom a comfortable personality. An environment that calls for perfection is not likely to be easy. But aiming for it is always a goad to progress.

In addition to this persistent striving for perfection, we believe an organization will stand out only if it is willing to take on seemingly impossible tasks. The men who set out to do what others say cannot be done are the ones who make the discoveries, produce the inventions and move the world ahead. T. J. Watson used to tell our people, "It is better to aim at perfection and miss than it is to aim at imperfection and hit it."

As a result of this insistence on perfection and the way we went at almost impossible tasks, there soon developed within the company what might best be called a tone. It was a blend of optimism, enthusiasm, excitement and pace. The company was always on the move, constantly changing, always striving for something better. Evidence of it was everywhere — new products, new branch offices, sales contests, slogans. Better to do something — even the wrong thing — than to do nothing at all.

Part bluster

Believing in success can help to make it so. Back in 1924, when things like butcher scales and time clocks were still mainstays of our business, we had the temerity to change our name from the Computing-Tabulating-Recording Co. to the International Business Machines Corp. We constantly acted as though we were much larger, much more sophisticated, much more successful than any current balance sheet might bear out.

As I have already pointed out, part of this tone was optimism, of course, and in this my father excelled. One day during the Depression of the thirties, my father met one of his major competitors in an art gallery. IBM was not doing particularly well but was managing to equal its previous year's income. The other fellow was having more difficulty.

He said to my father, "Tom, I hear you're still hiring salesmen in spite of the Depression, and I just can't see how that's a prudent thing for your business."

My father said, "Well, Bill, you know, when a man gets about my age, he always does something foolish. Some men play too much poker, and others bet on horse races and one thing and another. My hobby is hiring salesmen."

This optimism, which may have been little more than an enlightened guess, paid off. When business turned up the next year and then started to boom during and after the war, IBM was very glad my father had hired those salesmen.

We had an IBM day at the World's Fair of 1939 and next year brought 10,000 of our people to the fair at

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EXTRA

There are times in an organization when an instinct for leadership and drama is often more important than following the book on good management procedure.

T. J. Watson Jr., remembering the early days.

company expense. People realized they were working for an unusual individual and an unusual company that was capable of doing unusual things.

By the 1930s, our sales conventions had become spectacular affairs. Salesmen, on awakening, would find newspapers under their doors carrying a complete account of the previous day's events. Our overseas salesmen attended our conventions at that time, and when they got to their seats, they found small headphones with which they could hear the speeches in their native tongues.

Quite a business

When General Eisenhower, then president of Columbia University, went to Endicott to address a Hundred Percent Club meeting in July 1948, T. J. Watson persuaded him to spend an extra hour and talk to the plant people. Within that same hour, the people were let off from their jobs, and a platform was constructed in the street outside the main plant.

As the general and my father climbed the steps, the carpenters hammered in the last nails. "My gosh," one worker was heard to say, "what a business."

In a way, no one knew quite what to expect next. It may not have been management according to the book, but it seemed to keep us on our toes. Things were always being done in a highly vigorous fashion, with little regard for how much energy was being expended but with a great regard for the quality of the result and for the impression it would make on people.

In 1934, we told the sales force that as soon as the company's profits were doubled, the annual convention would be held in Europe. All salesmen making their quotas would qualify for the trip. The year of doubled profits came in 1941, but Hitler had other plans for Europe, and the idea of the trip was swallowed up by the war.

Then in 1961, one of our old-timers, a salesman who had qualified for that trip, wrote to remind me that the pledge had never been fulfilled. I knew that I had to make good on the promise and was glad of the opportunity. So in the summer of 1962, 187 salesmen who had qualified for that trip traveled to Europe with their wives to keep the date that had been interrupted.

The trip provided an interchange between American and European salesmen with, we hope, mutual benefits. In addition, it proved to be a great morale booster on both sides of the ocean.

Looking back on it now, I can see that many of the things we did in the formative years were anything but scientific. But what we learned, I believe, is that there are times in an organization when an instinct for leadership and drama is many times more important than following the book on good management procedure.

Setting the tone

What T. J. Watson did, probably more than anything else, was to set the tone for IBM. This was created in large part by the beliefs he brought to the company, for with them he brought vigor and great excitement. But it was also colored by his own good sense of what would be the most appropriate for the time and the situation.

When things were difficult and the sledding was uphill, he could be very optimistic. But when things looked good and our future began to clear up, he was forever cautioning us against getting complacent about it. I suspect this is a necessity for any leader — to be a balance wheel, a leavener.

Certainly no one can argue with the results. From 1914 to 1946, our company's profits grew 38 times. By the end of World War II, IBM's management had developed a deep belief in the policies upon which we had built our business: respect for the individual, major attention to service, and drive for superiority in all things.

WHO KILLED COBOL JOE?

2:15 A.M. TUESDAY
Middle of the night,
COBOL Joe bolts upright.
The phone has rung.
The trouble's begun.

10:00 A.M.
Application abend.
Hex data—no end.
Under ISPF with records too long,
Can't find where the data went wrong.

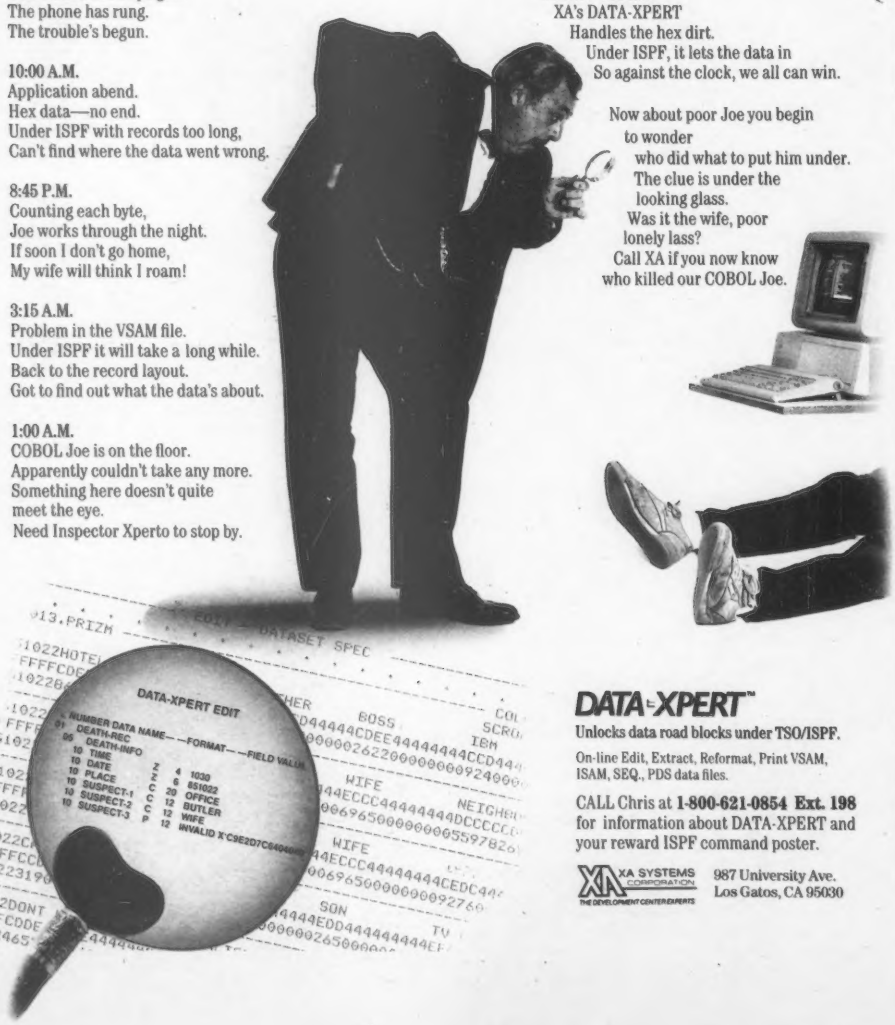
8:45 P.M.
Counting each byte,
Joe works through the night.
If soon I don't go home,
My wife will think I roam!

3:15 A.M.
Problem in the VSAM file.
Under ISPF it will take a long while.
Back to the record layout.
Got to find out what the data's about.

1:00 A.M.
COBOL Joe is on the floor.
Apparently couldn't take any more.
Something here doesn't quite
meet the eye.
Need Inspector Xperto to stop by.

2:10 A.M.—The Inspector Speaks
Too late now
To show Joe how
XA's DATA-XPERT
Handles the hex dirt.
Under ISPF, it lets the data in
So against the clock, we all can win.

Now about poor Joe you begin
to wonder
who did what to put him under.
The clue is under the
looking glass.
Was it the wife, poor
lonely lass?
Call XA if you now know
who killed our COBOL Joe.



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LU6.2

Born to be a standard

LU6.2 got a boost in the universal connectivity race when IBM announced personal computer capabilities in October. It's the talk of the town now, but users are wondering what they'll be using it for in the office.

By John Dounis
and Sharon Efroymson

The shackles binding the Personal Computer during mainframe communications will soon be broken. In place of the master/slave relationship of the past, the Personal Computer and every other network resource will be free to process distributed files intelligently.

That is IBM's message in the October announcement of a Personal Computer level in the capabilities of the LU6.2 protocol.

Accessing data from the mainframe has been a thorn in the side of many a micro user tapping into network resources. The Personal Computer functions most effectively as an intelligent workstation when used as a stand-alone. But when connected to the mainframe, the Personal Computer is relegated to dumb-terminal status by IBM's Systems Network Architecture (SNA). Practically, this means users must download data to the Personal Computer and only then resume using it as an intelligent workstation.

John Dounis is the director of systems development and consulting for the Center for Advanced Data Processing, Inc. (CADP) in New York.

Sharon Efroymson teaches personal computer communications to corporate clients at the productivity center of CADP.

Industry observers view LU6.2 as one of the most important architectures IBM has introduced in recent years. IBM's Advanced Program-to-Program Communications (APPC) consists of LU6.2 and its partner, PU2.1 — enhancements to SNA that promise to simplify communications, introduce program-to-program processing and provide the industry with a much-needed standard.

Program to program

The APPC architecture allows for a direct application-to-application interface between processors. Any two programs on any two computers on a network can communicate, regardless of the computers, operating systems or languages used.

When LU6.2's full potential is realized, it is expected to revolutionize data processing, to legitimize distributed transaction processing and to free intelligent terminals such as the Personal Computer on a network to claim their full potential. It is this last application that vendors and potential users see as the most significant.

"This is a radical move," says Tony Percy, director of product planning and integration at Applied Data Research, Inc. "At last IBM is saying, 'No longer does the mainframe have complete control or have to get involved.' In the past, IBM promoted a hierarchical view."

The announcement of APPC has been particularly well received by Personal Computer product vendors, such as Lotus Development Corp. "APPC allows users to put the mainframe

behind the Personal Computer and to have the illusion that all data resides on the Personal Computer," says David Reed, vice-president of research and development of the Information Services Division.

"From Lotus' point of view, mainframes are relatively uninteresting. The mainframe should be viewed as an extension of the Personal Computer," he notes.

Prospects for integration

While not every user is looking for a microcomputer-oriented hierarchy, vendors and users alike are very interested in the prospects for integration offered by LU6.2. Hardware and software vendors plan to incorporate the LU6.2 architecture as a real solution to integrating distributed systems.

When the APPC architecture is fully implemented by these vendors, true distributed data processing with multiple processors (mainframe, mini and micro) and network types (local-area and wide-area) finally will be established. Most important, APPC establishes a single architecture in distributed processing and peer-to-peer communications that software developers will be able to use.

However, at this stage of the game, no one can be certain how these changes will translate into the real world. Which applications actually will be developed rests on IBM, third-party developers and internal data processing departments.

APPC is now implemented in some of IBM's hardware and software products. LU6.2 and PU2.1 support is now offered for the System/38 with Release 5 of the Control Program Facility and Vertical Microcode extensions. This support is also implemented with the IBM Displaywriter and Scanmaster or in conjunction with Document Interchange Architecture (DIA) and Document Content Architecture (DCA).

IBM's recently announced token-ring network will also support APPC, as will a number of hardware vendors that interconnect with IBM.

Many users are having difficulty seeing how APPC will affect the way they use Personal Computers, since many of the supporting products do not exist yet.

"When we talk to our customers about APPC . . . a lot of them ask, 'Why should I change from the way I'm already doing things?' APPC is not a product for 1985; it's really a 1988 product," says Tim Wise, vice-president of Pathway Design, Inc., a software company providing predominantly SNA communications emulation.

Vendors are looking into the future and conceiving application solutions for user needs. Lotus already has developed Symphony/Link, which connects micros to mainframes through Digital Communications Associates, Inc.'s Irma boards.

"We plan to continue to take data from other computers in the corporate world. We'd be silly to ignore LU6.2, since it allows you to do just that," Reed says.

"Historically, architecture has not been as interesting as the products that support the architecture. What will interest Lotus will be which particular features of LU6.2 get implemented in IBM devices.

"Ideally, the peer-to-peer data sharing that LU6.2 provides will be used," Reed continues. "With LU6.2, a mainframe, a System/36 or other IBM hosts will give easy access for Personal Computers to run Symphony or 1-2-3 and to allow users to perform actual data extraction instead of just downloading.

"The main difference will be that any interaction will be less visible to the user, and you won't know what communications activities are going on behind your back," he notes.

Practically speaking

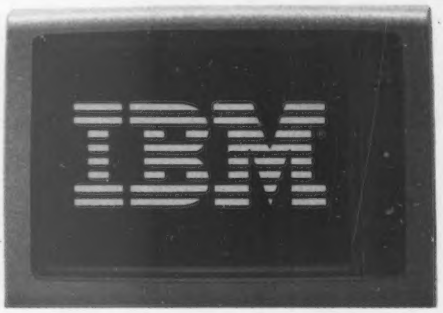
"The user now has to take explicit steps to log on to the mainframe and extract data through interactions. However, the process is very slow."

In its most practical applications, LU6.2 will allow the developer to converse with a remote data base, extract (or update) the required information, checkpoint the transaction (both locally and remotely) and terminate the conversation. This setup allows actual data extraction instead of forcing downloading of files. Users will be able to query remote data bases and perform actions as though the data base were local.

Currently with LU6.2, for example, a user is able to enter a transaction at his terminal that is connected to a System/38 in Los Angeles. When a particular transaction is executed, the system determines that the requested data resides on the System/38 in Chicago. The Los Angeles System/38 routes the transaction to Chicago over a Synchronous Data Link Control

'When we talk to our customers about APPC . . . a lot of them ask, "Why should I change from the way I'm already doing things?" APPC is not a product for 1985; it's really a 1988 product.'

Now playing on



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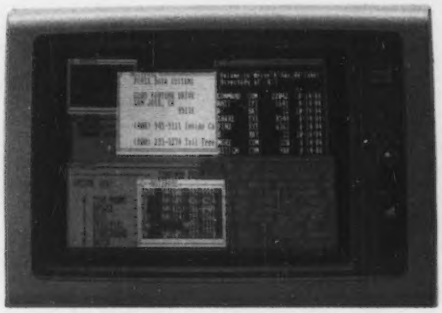

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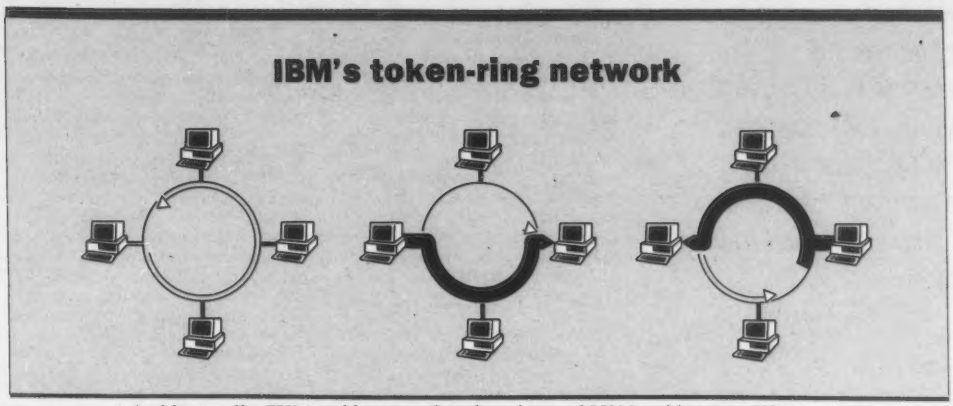

Architecturally, PU2.1 resides upon the token ring, and LU6.2 resides upon PU2.1.

(SDLC) network, and the transaction is processed remotely in Chicago.

With the recent announcement of APPC for the Personal Computer:

- A user with a micro attached to the mainframe will be able to use his local data base on the micro and use information from the mainframe as required.

For example, the user could execute a transaction on the Personal Computer, and if the information is not resident, it will automatically be requested from the host — transparently to the user.

- The same is true of the implementation of LU6.2 with a token-ring network. If the user's micro doesn't possess the required information, it will establish a conversation with one of the other micros on the token-ring network that does contain the information.
- Users will also be able to establish an SDLC session between two micros to coprocess information.

International access

A future implementation of the APPC architecture will be able to use the existing SDLC network to get to a particular node in the network. For example, a totally distributed data processing facility may include an international network where the data for a local office or region resides on the local computer (regardless of machine size).

'LU6.2 support for the Personal Computer has been the missing piece.'

When the user requests data that is not locally available, the system will initiate a session with another intelligent node in the network, and the information will be requested.

For example, the Detroit office of an international insurance company might connect a Personal Computer with an APPC application to the host processor at the New York headquarters. An important customer from Geneva enters the Detroit office and needs immediate information about his account.

The customer service representative in Detroit enters the inquiry, and the system determines that the required data is not in the local data bases. The data, however, is resident in the Geneva system that is on-line through the network and also supports APPC applications. The Detroit system then establishes a session with Geneva through New York's domains, the inquiry transaction is executed at the remote Personal Computer in Geneva, and the information is transmitted to Detroit.

In the future, no host may need to get involved, and the transaction will be processed using the existing VTAM/SDLC network, 3705 communications processor and communications lines (telephone lines or microwave).

Another application of the architecture's facilities is storing predefined screens in local nodes. With APPC, the user's commonly used screens can be stored on the user's local computer,

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In Crocker's view, IBM's announcement of the protocol freed developers to build applications with true distributed processing. 'IBM now says [distributed processing is] the OK thing to do, and here's how to do it. The company has removed the stumbling blocks; developers had been afraid to do something because they weren't sure where IBM was headed.'

and the applications programs will use them as required.

Therefore, the network will carry less operator-related cosmetic information, such as the screens, and more data. That is, overhead will be reduced in favor of carrying the actual information that is requested.

Although the concept of storing the screens remotely was introduced in the mid-1970s, it did not catch on as an industry standard because of the limitations imposed by the 3790 communications processor.

The missing piece

"LU6.2 support for the Personal Computer has been the missing piece," says John Crocker, executive vice-president of information systems at On-line Software International, Inc., a software product vendor for large-scale IBM environments. "Although the LU6.2 protocol has been on mainframes and minicomputers for some time, until recently it was not available on the Personal Computer.

"Until this protocol was announced, the technology that the vendor had to use was terminal emulation," Crocker says. "The dumb terminal protocol is something every device understands.

"Terminal emulation was never designed for intelligent applications. It was designed for transferring screens of information from the mainframe to the terminal," he adds. "It was never designed for a heavy volume of data transfer. With the old system, the software had to know a lot about the protocol."

In Crocker's view, IBM's announcement of the protocol freed developers to build applications with true distributed processing. "IBM now says it's the OK thing to do, and here's how to do it. [The company has] removed the stumbling blocks; developers had been afraid to do something until now because they weren't sure where IBM was headed," he says.

According to Robert Sundstrum, manager of IBM's Communications Systems Architecture of the Communications Products Division at Research Triangle Park in Raleigh, N.C., APPC was developed to answer a need for distributed transaction processing across multiple hosts.

"LU6.2 is the architectural solution for all products to communicate with," Sundstrom explains. "IBM was motivated to introduce APPC to provide a common set of protocols that allow any set of products to communicate using the same protocols."

LU6.2 and PU2.1

To understand how LU6.2 and PU2.1 benefit networks, it is first important to distinguish between the two.

LU6.2 and PU2.1 address different layers in the SNA architecture. LU6.2 addresses the session and presentation levels; PU2.1 addresses the physical level (transport level) that deals with link activation and routing. The logical unit resides above that transport network and works with it.

PU2.1 allows processors to communicate as peers. For example, 5520 devices are able to communicate directly with other 5520 devices, Personal Computers can communicate with other Personal Computers or with System/36s, and System/36s can communicate with other System/36s.

A processor does not have to be defined as a host to communicate with another processor. It is a new architecture that provides extensions for peer-to-peer communication and parallel session support that allow for multiple conversations with host systems.

With its current implementation of the architecture, PU2.1 facilities will not be implemented in micro-mainframe links with the IBM 370. When these links are required, PU2 will still be implemented with the Personal Computer, and the other LU6.2 facilities will still be available. However, as a PU2 device under the 370, the Personal Computer will not support multiple sessions.

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"LU6.2 was designed for many of the same reasons as the Intersystem Communications Facility," Sundstrom says. "It was designed to handle program-to-program communications with an appropriate set of protocols that would work both at the high end, with large-scale mainframes, and at the low end, such as in departmental systems.

"APPC was designed for ease of development for programs that would communicate. It was designed for our internal use and for use by third parties."

IBM provides applications today that utilize LU6.2. For example, DIA with the IBM Displaywriter and Scanmaster, the 3820 page printer with PSF and other applications are available on System/38 and 36. The System/38 and 36 provide a firm foundation and can provide the interfaces to third-party vendors.

Most installations, however, have become more compute-intensive at the Personal Computer level than on the computer room floor, Sundstrom points out. In some instances, processing data at the host will be appropriate; at other times, the host will function as a file server and will pass data to the Personal Computer for processing.

"LU6.2 gives you the ability to cooperate in processing," Sundstrom points outs. "Peer-to-peer communications will mean larger messages and less frequent messages; this will have network performance implications."

With the IBM token-ring network, a user will be able to talk across the local-area network. LU6.2 can reside on the network with the SDLC adapter and route data between the network and the host. Paths will be available that allow data to be accessed with a protocol converter or a local-area network gateway.

"A variety of interesting applications will be developed with Personal Computers. We're really staged now for customers and vendors. And third-party vendors will play major roles in the implementation of APPC," Sundstrom says.

Frank Thieroff, vice-president of architectural services at Chemical Bank, expects to use LU6.2 with the intelligent workstation.

"LU6.2 has been out for a while," Thieroff explains. "The excitement will be its integration with intelligent workstations in the future. One will have the ability to design cooperative systems that will take advantage of the local intelligence of the Personal Computer in collaboration with the back-end processors that provide more extensive data management services.

"The system can be designed to have the Personal Computer preprocess information and reduce the amount of communications required to the host," he says. "If the host is down, users will be able to store the data at the Personal Computer and forward it to host at a later time. Systems in general will tend to be more reliable and will rely on the host when it is available.

"The System/36 with LU6.2 could be a reasonably powerful product for supporting data entry and data gathering interaction, specifically when integrated with the Personal Computer. What is disappointing is that LU6.2 support for Personal Computers wasn't announced a year ago."

'The main reason that LU6.2 has become a hot subject is because IBM says it is. The company stated that LU6.2 will be the way of the future in its System/36, System/38 and IBM 370 statement of direction.'

Enthusiasm, caution

SNA is the main network architecture for Chemical Bank, with gateways from other processors accessing the SNA backbone. LU6.2 will be the standard, and integrators will not need to worry where the exchange takes place. It is the unification protocol that enables users to ignore the nature of the individual processor.

"When I will use LU6.2 is pending on a lot of announcements from IBM, [Digital Equipment Corp. and Wang Laboratories, Inc.]," Thieroff notes. "We want to see what linkages will be developed and if they will use it."

"With cooperative processing, a need has always existed to transfer data from the mainframe to Personal Computers," ADR's Percy says. "Until now we've developed and used our own ADR protocols. However, we'd rather use IBM's.

"If we're talking about an application on the Personal Computer that needs information from a mainframe, they have to speak the same language. We acquired Progress, a product from Data Language Corp. that is a fourth-generation language with which we may want to initate a transparent link.

"LU6.2 and the Personal Computer will be supported with CICS Release 1.7, and [CICS] will be the only mainframe application with which [the

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Personal Computer] will interface," Percy says. "LU6.2 allows sessions to be held between applications running under CICS and those on the [Personal Computer] to converse. The big issue for ADR is, do we develop our own language or find something on the outside?"

Pathway Designs' Wise is enthusiastic about the future of APPC but approaches it cautiously. He says, "Anybody betting his company on LU6.2 next year will lose. The pioneers will make limited money with it this year, a little more the following year. It will be 1988 before you see it fully implemented." Useful applications are needed to provide users with the impetus to convert to APPC.

"The main reason that LU6.2 has become a hot subject is because IBM says it is. The company stated that LU6.2 will be the way of the future in its System/36, System/38 and 370 statement of direction," he notes.

According to Wise, in implementation, "APPC will require horsepower at the distributed level. Due to the sheer number of conversations and sessions, it will eat up memory in the host and in the Personal Computers. Multiple conversations to the same logical unit, the cost of establishing the link and [executing] BIND processing are expensive."

Although IBM 3270 technology is not sufficient for the integration of intelligent workstations into the network, Wise estimates that it will stay around until the 1990s, when networking and tightly entwined distributed data bases are implemented.

Distributed DP

Many important products will come from third-party vendors. The data will then be segmented and segregated across multiple processors. Local-area networks will continue to expand, and with that network expansion will come distributed data processing.

Wise sees more offices consolidating their media with the installation of local-area networks. This first sign of integrating Personal Computers reduces the incidence of sharing floppies. The second level of integration is the gateway to the host that allows users to "hot-key" between local applications and access information from the host. At this level, users can download files for local manipulation. Finally, APPC allows the total integration of applications and data that allows users to access any data on the network selectively.

"Unfortunately," Wise points out, "people forget that PU2.1 services are just as important as LU6.2." Although IBM announced PU2.1 services two years ago, they are not yet fully documented. Third parties cope with the lack of documentation through reverse engineering.

"This is a problem in dealing with IBM," Wise says. "Although IBM claims to support the third parties fully, it often doesn't let out all the information, and we have to try to figure out what they are doing. We put in the inputs and see what outputs are generated."

On the bandwagon

Unlike Wise's cautious approach, other vendors have jumped onto the LU6.2 bandwagon. One is Paul Rampel, president of the Orion Group, Inc.

Orion recently announced the availability of its SNA62 Peer Communications Facility. This product provides a complete implementation of the LU6.2 protocol and PU2.1 to run on the Convergent Technologies, Inc. Miniframe and on the AT&T Unix PC. SNA62 is targeted for OEMs and was developed using the C language for a range of operating systems environments.

Rampel points out, "Our marketplace is principally OEMs and systems integrators, and we are getting into the market in a time when OEMs are looking at connectivity. We felt these protocols would become a necessity for OEMs to maintain a presence in SNA-dominated architectures.

"LU6.2 will solve problems that

'Reverse engineering is a problem in dealing with IBM. Although IBM claims to support the third parties fully, it often doesn't let out all the information, and [the third parties] have to try to figure out what it is doing. [The third parties] put in the inputs and see what outputs are generated.'

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IBM was experiencing in its own product line. Historically, multiple logical units were developed around particular applications. That resulted in [logical units] becoming incompatible with one another, and no single protocol existed that would allow them to be interconnected across the variety of products. LU6.2 was designed to run across the entire product line."

This functionality is important, especially when users desire to mix and match hardware. "It has the prospect of solving a real industry need and to become a single industrywide standard for communications," Rampel says.

Some vendors express reservations. ADR's Percy says, "Although LU6.2 is a step forward, in practice it leaves a lot to be desired. In CICS, [LU6.2] required 25,000 lines of code to implement because the old CICS architecture is not layered as SNA is.

"Therefore, it is hard to define CICS architecture to match LU6.2. Because of the restrictions imposed by the architecture of CICS and IMS, IBM itself may be restricted in implementing APPC fully."

ADR has been investigating the potential of LU6.2. In its next release of E-Mail (targeted for the first quarter of 1986), ADR will include support for LU6.2 for the routing of electronic mail messages between multiple CICS systems.

Not new ground

Distributed transaction processing is neither a new concept nor a new implementation. Currently, DEC has implemented distributed transaction processing for six years and developed its own international corporate network connecting more than 6,000 devices.

Users anywhere on the DEC network may execute a transaction that will locate the required data at another (remote) node in the network. In addition, DEC microcomputers and IBM Personal Computers that are connected to a VAX through the Decnet network with Decnet-DOS already support distributed transaction processing.

David Korf, multivendor networking marketing manager at DEC, says, "DEC has been shipping these products for a long time. You can compare the IBM announcement of distributed transaction processing to the conquistadors coming over, staking out ground, planting their flag and claiming the new world. The natives say, 'What new world? This is our backyard.' "

Decnet, which is 10 years old, can carry videotex and electronic mail and perform true office automation for document sharing, network management and virtual terminal capabilities.

Link to Japan

"I can log on at 6:30 a.m.," Korf says, "and go to another node in another part of the world — for example, our research and development center in Japan — and be able to process a distributed data base transaction."

DEC is one of the vendors that already support LU6.2 and DISOSS. Users can link their Decnet to SNA networks through their Decnet/SNA gateway, Gateway Access Software or VMS-SNA system and access data. The DEC users are not aware that they are connected to an IBM host and therefore need not learn a new set of commands.

DEC has implemented other gateways between its

'You can compare the IBM announcement of distributed transaction processing to the conquistadors coming over, planting their flag, staking their ground and claiming the new world. The natives say, "What new world? This is our backyard."'

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products and IBM's. For example, DEC workers can exchange data using DIA and DCA in Final Form and Revisable Form.

"When documents are passed through the gateway to the DEC user, the terminal will beep and show that [the user] just got new mail from the Displaywriter," Korf says. The interface is based on LU6.2, as an architectural interface that looks like an IBM device, and it transfers the document to or from a Decnet network.

"This alternative was chosen for investment protection [because it] is less susceptible to changes in software releases. We allow different options to the product and provide the ability to interface and distribute a document," Korf says.

LU6.2's potential for enabling distributed processing, enhancing network performance and allowing peer-to-peer communications promises to change the nature of data communications.

"DEC adopted the LU6.2 standard to interface with IBM because we were concerned with investment protection for our customers, and we're concerned with investment protection for us. We don't want to throw away our engineering time. DEC announced its intent to support LU6.2 in February 1984, and in October 1984, it was delivered."

With competitive vendors supporting LU6.2 and PU2.1 and with vendors of IBM products already planning to incorporate the architecture into future products, the protocol is clearly on its way to becoming an industry standard.

The protocol's potential for enabling true distributed processing, providing for actual data extraction from any processor, enhancing network performance and allowing for true peer-to-peer communications promises to change the nature of data communications in the near future.

Fruits of labor

The October announcement of LU6.2 protocols for the Personal Computer heralds more significant changes coming in APPC — a break from the mainframe-oriented hierarchy of SNA.

With the Personal Computer freed to resume its capabilities as an intelligent workstation in a network system, APPC promises to simplify and improve data handling in the workstation of the future.

While it may be some time before the protocol affects communications in the user setting, vendors are already designing the applications needed to provide users with the impetus to convert to APPC.

How APPC will actually affect communications depends on the fruits of this developmental stage. But based on its initial reception and on planned announcements from vendors in the coming months, APPC/PC will evidently have a very significant impact on microcomputer communications.

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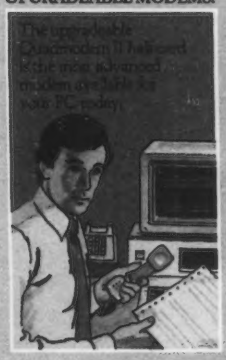

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How LU6.2, PU2.1 work

The introduction of LU6.2 is important, for it sets up standardized architectures and protocols on which vendors can build. It will have the greatest impact not on the protocol level but at the applications level.

To understand how LU6.2 and PU2.1 benefit networks, it is important to distinguish between the two.

LU6.2 is the specification of protocols that evolved as an enhancement to IBM's Systems Network Architecture (SNA). It directly addresses peer-to-peer protocols and gives the applications developer the set of commands needed to establish conversations with remote processors.

PU2.1 defines peer node types and allows each node to act as a peer to any other node on the network. Users with intelligent nodes will be able to establish sessions with other intelligent nodes in the network for data communications purposes. PU2.1 will allow users to establish sessions and communicate directly, without processing through the host.

LU6.2 addresses the session and presentation levels, while PU2.1 addresses the physical (transport) level. The two work hand-in-hand to take the place of terminal emulation. Together, they fall under the umbrella of Advanced Program-to-Program Communications (APPC): software that supports SNA communications over token-ring and Synchronous Data Link Control (SDLC) links.

Setting standards

The introduction of the LU6.2 protocol is important to vendors, for it sets up standardized architectures and protocols on which the vendors can build. It will have the greatest impact not on the protocol level but on the layer above, at the applications level. The application can send the request in a manner that any other processor can understand in the same format.

John Crocker, executive vice-president of On-Line Software International, Inc., says, "APPC provides the highway to get from point 'A' to 'B' without [the developer's] having to know the mechanics of how to get there. Now that we [the vendors] have the highway to travel on, we need to build the vehicles — the applications."

Two options are available for integrating the LU6.2 protocol: the open and closed Application Program Interfaces. With the open interface, an application can be written using LU6.2. With the closed interface, LU6.2 is incorporated within the existing application, allowing it to communicate with other processors for data communications. This means intelligent devices such as the Scanmaster can be included in existing networks.

Historical applications

A predecessor to APPC is the Intersystem Communications facility (ISC). It allows applications developers to process remote transactions within other CICS and IMS regions or machines. Until the ISC was introduced, interapplication processing within the IBM world did not exist.

The ISC was originally announced as LU6 in CICS/VS Release 1.4. Two CICS systems could use a single session to process a transaction between them. The ISC was upgraded to LU6.1, whereupon it allowed communication between two CICS systems, two IMS/DC systems or a CICS and an IMS system (in CICS/VS Release 1.5 and IMS/DC Release 1.1.6).

LU6.1 allowed multiple concurrent sessions to be supported across applications. LU6.2 has been integrated with the ISC in CICS Release 1.6, and it allows for synchronous program-to-program attachment and a conversational flow of transactions. PU2.1 is an enhancement of PU2, which is commonly used in IBM 3270-type devices. PU2.1 was introduced to support parallel or primary logical-unit sessions and can have multiple links, where PU2 can have only one.

In addition, PU2.1 allows primary sessions that generate the communications poll; by contrast, PU2 only allows a secondary session. The PU2.1 implementation allows two Personal Computers to establish a unique SDLC session between themselves.

The recent announcement of APPC for the Personal Computer (APPC/PC) provides LU6.2, PU2 and PU2.1 support for the IBM Personal Computer, requiring a minimum of 208K-bytes memory on the Personal Computer with the token-ring network and the SDLC adapter.

APPC/PC allows Personal Computers to interact with other Personal Computers, IBM 370 (with CICS Release 1.7), System/36 and 38 or Series/1 (with RPS Release 7.1). It supports these processors as PU2.1 nodes, with the exception of a 370 configuration, where it supports the Personal Computer as a PU2 node.

In a down situation, your MVS operators can be faster and more productive with Console-Master.

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TOPVIEW

Top-heavy, not topflight

If IBM refines Topview, it could become a viable, even significant, product for corporate micro use — something it isn't right now.

By Robert Moskowitz

IBM introduced Topview in August 1984 as a multitasking "environmental manager." The purpose of the $149 software product is to allow an ordinary, single-function IBM Personal Computer to run several applications at once, with data and peripherals shared among them.

If successful, such a system would slice through one of the major limitations of the popular Personal Computer: the inability to shift quickly from one task, one project or one set of data to another. This limitation was what spawned a great many multitasking packages in the first place, integrated software such as Lotus Development Corp.'s Symphony and Ashton-Tate's Framework; desktop software such as Borland International, Inc.'s Sidekick and Conceptual Instrument Co.'s The Desk Organizer; and system software such as Digital Research, Inc.'s Concurrent PC-DOS, Application Executive Corp.'s APX Core Executive and North American Business Systems, Inc.'s Multi-Shift.

But each of these programs has its own shortcomings, so none has achieved the dominance that would make it a standard. Users turned to IBM once again for a standard method for multitasking on the Personal Computer.

Released with fanfare, Topview encountered severe criticism from the press and from user-evaluators almost at once. Among the major complaints were: It was slow, cumbersome, inefficient and memory hungry.

Topview's few supporters in the press countered with enthusiasm about its features and emphasized that the new software was more of a full-blown operating system than a simple environmental manager. Rumors circulated concerning IBM intentions to break away from PC-DOS and establish Topview as the main user interface for its entire family of personal computers.

Under the new system, it was rumored, applications that used a standard interface to work with Topview would automatically be able to exchange data with other applications holding to the same standard. But even more significant, they would be able to run without relying on what has become the most popular operating system in the world. Abandoning the Microsoft Corp. MS-DOS standard would mean new software could be developed without catering to MS-DOS limitations, but it would also mean charting new waters — a voyage with unpredictable results for users and software vendors alike.

These rumors did nothing to quell the argument that Topview is slow and cumbersome — that its performance is sluggish because most of its code is taken up with functions and features not yet enabled in the early releases.

Favorite son status

Despite the claims and counterclaims, users continued to be disappointed with Topview's performance level. If Topview had been released by virtually any other computer company, it would have been dead in the water from the first day. But because IBM affixed its name to the package and vowed to support and develop the Topview concept, a great many corporate users dutifully tested and evaluated the software.

Robert Moskowitz is a Woodland Hills, Calif.-based writer. He edits a national newsletter, "Office Automation Update."

Objective results from these evaluations are difficult to obtain. Some companies simply refuse to go on record about Topview. San Francisco-based Bank of America, a typical example, admits to having tested Topview and to not supporting its use but will not go into details.

A few major companies were willing to go on record with their opinions of Topview. However, not a single one of these organizations is using it. After a year or more of evaluating Topview with various applications packages and testing it against other "managers" and multitasking systems, their conclusions tend to echo those very early assessments: Topview is top heavy.

But nearly everyone who has worked with the program also concedes that if IBM continues to refine it with the proper development and support, Topview could become a viable — even significant — product for corporate microcomputer use.

'Micro users are no longer buying iron or the latest technology in software. We want to see support for at least one piece of software that has considerable impact, such as 1-2-3, before we will move to a new product in a big way.'

Joe Kane, an office systems specialist at General Dynamics Corp.'s corporate headquarters, says that Topview is "basically a good product, but there are competitive products just as good or better." He named Microsoft Windows, Symphony and Concurrent PC-DOS as examples of packages that do a better job of running several stand-alone software products under multitasking or integrating several different applications into one package.

Kane made clear, however, that he feels IBM was trying for something more than an environmental manager when it developed Topview.

"IBM's goal was to provide a standard shell, inside of which applications can talk to each other," he suggests. "They want all applications to work smoothly. They want different workstations to perform more similarly. They want users to have the flexibility of using an application's standard keystrokes to run the software from menus or do things however the user wants.

"It takes IBM to set this kind of standard. It will be great if [IBM] can achieve it. But so far, [the company] hasn't."

Kane says that Topview is strongest right now at putting many different applications under one shell and thus saving time for high-salaried micro users. Its major benefit is the ability to swap data back and forth between various applications. But, he asserts, there must be a great many more applications packages developed that use the Topview standard. "Otherwise," he says, "there is little a user can do with it."

Hank Kee, vice-president for personal computing and office technology architecture at New York's Chemical Bank, is another expert who evaluated Topview and decided not to adopt it companywide.

"I don't know of anyone in New York who is using Topview," he says. "We have tested it and worked closely with a few users, and we have found it unsatisfactory.

"It's a product with lots of promise," Kee admits. "But the actual delivery of the product fell far short of my expectations. In fact, it had a depressing effect on me: I expected a heck of a lot more. My understanding is that the potential is there, but it is just not realized."

All alone

One criticism Kee leveled is that IBM released Topview without enough applications software to support it. IBM included a softcover book listing about 100 third-party applications that had been tested and found compatible with Topview. But some of the most popular applications, such as Micropro International Corp.'s Wordstar, Lotus' 1-2-3, and Ashton-Tate's Dbase II, were not — and are still not — on the list.

Other software packages not on the list may operate with Topview, but users encounter errors and problems when using unlisted software in the Topview environment.

"The presentation of new hardware or software is of little use unless it's tied in with applications," Kee points out. "Topview by itself has little value to me or to anyone. Microcomputer users are no longer buying iron or the latest technology in software. We want to see support for at least one piece of software that has considerable impact, such as 1-2-3, before we will move to a new product in a big way."

Along with many other evaluators, Kee found flaws in the new software. "You never know how much memory you have left," he says, "and the CHKDSK program doesn't work properly with Topview. The computer

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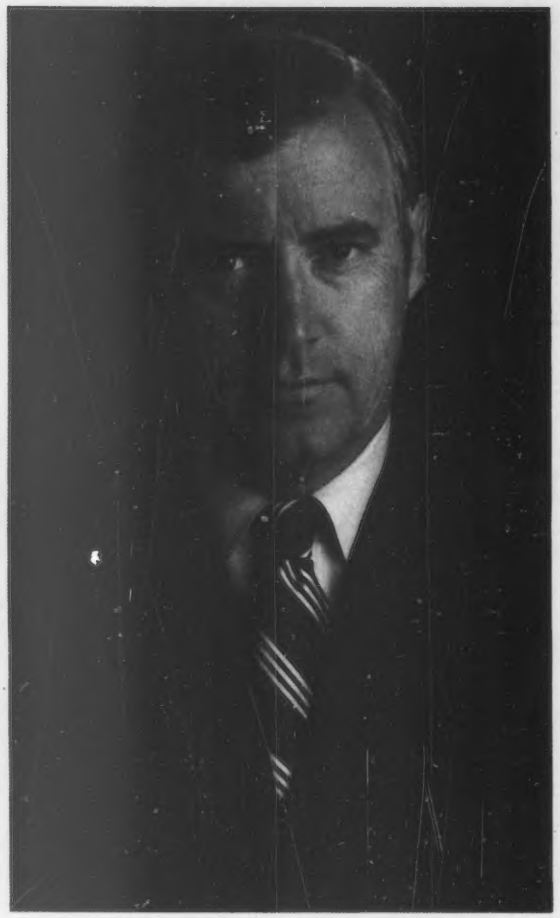
The time has come for straight talk about database management systems.

"The only reason to buy a database management system is to build better applications."



Throughout the history of the software industry, proponents of one database architecture after another have promoted their respective systems as the sole solution to a company's application backlog problem.

The early debate centered on hierarchical versus network architecture. Advocates of inverted file entered the argument in the 70's. And today, relational is the architecture of choice.

While this discussion about architecture is interesting, it's just not the issue.

Database management systems, beginning with the very first, were created to do one thing and one thing only—they were created to build better applications. *Building applications—efficient, online applications, faster, with fewer people—is the only real issue.*

Today corporations have a huge backlog to contend with. And the applications they need to develop have different characteristics. Some may be retrieval only. Some may be heavy on update. Some will run the company, and will require professional development. Some can be created by end users to satisfy their own needs.

It is extremely important to have a database management system that can handle all applications. *It is essential* that a database include tools rich and comprehensive enough to accommodate both the professional developer and the end user. It's the richness and power of these tools that's critical to the successful implementation of highly responsive fourth generation applications. What's demanded, in fact, is software that goes a *step beyond* today's conventional relational database systems.

With a comprehensive database management system and the appropriate tools like the kind I'm talking about, you'll make the data processing department a *strategic asset* instead of corporate overhead. You will make your company succeed in a highly competitive world.

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John J. Cullinane
Chairman of the Board

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The only database management system worth buying is one that meets these six requirements.

Stated simply, IDMS/R is a step beyond today's conventional relational DBMS because it meets these key requirements for building successful applications.

1. MIS Application Development Facilities

The application development system required to build high performance production applications requires more than a fourth generation language. Cullinet's ADS/OnLine is a comprehensive application development environment for the MIS professional combining fourth generation language with a menu-driven modular development approach. Integrated with the data dictionary, this minimizes not just the programming but the entire design, development and documentation of an application. Furthermore, this approach produces a dramatic reduction in maintenance and support.

2. End-User Application Development Facilities

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3. Relational Architecture

IDMS/R allows for the definition of databases using the relational data model. Data tables and associated user views are easily defined online. Additionally, any number of key fields may be defined. IDMS/R also supports advanced relational features including referential integrity and domain definition. This architecture provides the capability to address all application requirements.

4. High Performance Database and Application Tuning Facilities

IDMS/R is a full multi-tasking, multi-threaded system providing for concurrent processing of online and batch, update and retrieval applications. Additionally, tuning facilities provide efficient indexing techniques, space management, page management, and buffer management. No conventional relational DBMS has these capabilities.

5. Dictionary Driven DBMS

Data integrity and data independence are essential in a DBMS environment. The dictionary actively controls the source and use of all data. Data definitions, data validation criteria, data formats and security are all defined within the dictionary and exist only once, eliminating redundancy and ensuring integrity. This information is then automatically used throughout the system. Examples of the functionality of this facility include never needing to define output formats for query; never needing to define field attributes for screens; never needing to code validation and editing criteria when using ADS/OnLine. Only IDMS/R provides this level of dictionary integration.

6. Open System Architecture

With the unique Open System Architecture of IDMS/R you can maximize your investment in existing software. IDMS/R accepts data from outside the database environment with direct access to VSAM files. In addition, applications written to access other databases like IMS, DL/1, TOTAL, or VSAM can directly access IDMS/R without modification. IDMS/R is designed to work in virtually all IBM mainframe operating systems and teleprocessing monitor environments.

IDMS/R: More than a relational DBMS

Cullinet

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'IBM [did not design] Topview for today but for processors like the Intel 80286... It may well become the operating environment of the future.'

just hangs up, and you have to reboot."

IBM representatives admit the former difficulty but refuse to comment on CHKDSK problems. Since its initial release, Topview has been updated only once. With Version 1.01, IBM eliminated three bugs that were found in the original version: two that happened only when users tried to run 1-2-3 within the Topview environment and one that sometimes occurred when more than one application initiated the disk read/write operations.

Gobbles up memory

Flaws and bugs aside, the most common criticism of Topview cannot easily be silenced: The package is a "byte hogger." Topview requires about 175K bytes of random-access memory (RAM), a considerable portion of the 640K-byte maximum for PC-DOS microcomputers. The problem is compounded by two tendencies:

- Microcomputer users often allocate 50K to 100K bytes for resident utility programs such as alarms, calendars, calculators and note pads.
- Software programmers often demand more RAM for their advanced applications. Many popular applications now require 256K bytes, for example, and some — such as Borland/Analytica's powerful Reflex data base — need 384K bytes.

As a result, there generally isn't room for more than one, or at most two, applications in the same memory space with Topview. Thus, the package's whole purpose is significantly circumscribed by its own use of memory. "By the time you bring Topview into memory," Kee explains, "how many other windows can you possibly run?"

IBM claims that Topview was developed in anticipation of the Personal Computer AT and other advanced technology computers that can address up to 4M bytes of RAM, and that when computers commonly possess that much memory, Topview's hunger for bytes will be much less limiting. However, Topview cannot address that much memory.

At present, Topview does not make use of any more than 640K bytes in any microcomputer and does not work with either of the two standard methods now on the market for addressing memory above the 640K-byte limit, so the claim rings a bit hollow.

Topview shows potential

William Synnott, senior vice-president of information systems and services with the First National Bank of Boston, notes that Topview shows more potential than present value. Synnott's staff at the bank does not currently use Topview but is looking forward to the improved viability of the product as IBM continues to upgrade it.

In the meantime, Synnott's users concentrate on Dunn & Bradstreet Computing Services' Dunn's Plus, a combination of theirs and other vendors' software running on IBM Personal Computer XT computers. The package gives users access to 1-2-3, Multimate International Corp.'s Multimate and Western Union Corp.'s electronic mail as well as outside or commercial data bases.

It also has the ability to import and export data between programs on the Dunn's Plus system and includes a "user install" section that allows virtually any software to be added to the basic system.

Users work from an overall menu that lists every program and possibility. Although it runs only one application at a time, Dunn's Plus automates such functions as getting stock price quotations from Source Computing Corp.'s Source, loading them into a 1-2-3 template and recalculating an entire portfolio.

Synnott believes the system possesses great potential for people who don't fully understand software but need fairly sophisticated computer functions.

Not a lost cause

Despite Topview's poor performance and the lukewarm reception it received, many in the world of corporate microcomputing still do not consider it a lost cause. "IBM has a way of resurrecting things," Kee explains.

"It's still the early days for this product," agrees Danielle Barr, vice-president of corporate systems with Bank of New England in Boston. "I don't think IBM designed Topview for today but for processors like the [Intel Corp.] 80286 and maybe even the 80386. It may well become the operating environment of the future."

She observes, "Often IBM is not the innovator technologically, but eventually it develops products that people want and need. It'll probably do the same with Topview."

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DB2 and IMS

The options doubled, and so did the confusion

If you don't buy IBM's dual-DBMS strategy, you may end up going it alone with IMS.

By Paul Hessinger

The medium to large-size IBM mainframe user community greeted the original June 1983 announcement of DB2 with skepticism, cynicism and, at best, cautious optimism.

Those attitudes, for better or worse, affected how DB2 has been evaluated and used thus far. With increasing frequency, data base planners in large IBM installations prepare reports and direction statements that express their confusion over the role of DB2 and their reactions to the data base, as various roles are considered for it. A replacement for IMS? Panic. An "information center DBMS"? Overkill? A relational front end for IMS? Inefficiency.

The cynical IMS user views DB2 as a reincarnated IMS. Some industry analysts agree, suggesting that the "new IMS" is a creation of marketing, not technical, personnel. In their view, IBM's real intent is to gather increased market share via a second data base manager. The company would give the impression that DB2 marks the first step in a move away from IMS — the Information Management System. The subsequent uproar will then lead IBM to reintroduce it as "IMS classic," no doubt — an improved version of the original formula.

Offering two DBMS is clearly consistent with IBM's mission in the data processing world — selling hardware — or so the industry analysts' song goes. The cautious optimist observes all of this while remembering that the IMS acronym stands for two things — and the first is "increasing mainframe sales."

Focus on large systems

IBM seems to be focusing its attention on large-systems environments with the dual-DB2/IMS strategy. Many of these installations are themselves going through a transition in terms of the information systems they are attempting to provide. "End-user oriented," "data driven," "flexible" and "integrated" are no longer simply nice ideas. These characteristics have become practical necessities in fourth-generation system engineering efforts.

The optimistic IMS user had hoped that at long last IBM would provide a viable architecture that would deliver efficient performance, relational data management and flexible information processing tools. Of course, these wishes represent a set of very high expectations for any single product or integrated set of products, not just for DB2. But early users found that DB2 does deliver some of what other IBM products, most specifically IMS, lacked.

The target environment for these products is not clearly divided between operational and end-user applications. IBM's version of an integrated software architecture must support both the high performance and management support environments.

Even for those installations with a strong affinity (conscious or otherwise) for mainstream IBM technologies, the dual-DBMS approach seems inconsistent with basic tenets of the data base concept, such as minimal redundant data storage. From a business

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Paul Hessinger is vice-president of research for Computer Task Group, Inc. in Buffalo, N.Y. He is also a speaker and corporate consultant on matters concerning the information systems community.

perspective, however, users report a strong desire for what might be described as "results at the expense of philosophical purity."

In trying to incorporate information technology into the operational and decision-making transactions of an enterprise, many organizations came to use the concept of corporate information architecture as a planning and design framework.

Admitting DB2 use

The concept of an integrated corporate data resource processed by even semi-integrated tools provided a backdrop for many organizations' evaluations of DB2.

In the last two years, the attitude, "So what if I use another DBMS?" has been voiced more frequently by DP managers. Again, users are pursuing results. At a major industry conference in the spring, a show of hands revealed that two-thirds of the 450 installations represented used IMS.

Another show of hands revealed approximately 125 DB2 users — you could actually count the hands because they went up slowly, as individuals looked around to see who else was going to admit in public to being a DB2 user.

A third question — "How many of your organizations are receptive to a second DBMS?" — produced an 80% show of hands. The subsequent panel discussion revealed that the motivating factors behind considering a second DBMS varied from a desire for integrated applications to a need for fourth-generation language facilities and relational data base support — results. These factors add up to fertile ground for IBM's introduction of a new DBMS.

Particularly in the next two to four years, the question "when DB2" will outweigh "if DB2."

An old Bulgarian proverb comes to mind as we attempt to put to rest once and for all the notion that IBM's DBMS strategy is as devious or as Machiavellian as some would believe. The pragmatic proverb says, "In times of great danger, it is acceptable to walk with the devil until you have crossed the bridge."

Here the "bridge" is analagous to one of many transitions — from batch to on-line transaction processing, from stand-alone to integrated applications, from process-oriented to data-driven, from custom solutions to fourth-generation tool-driven information processing. Overall, the bridge represents the transition to a corporate information architecture concept many firms are attempting.

DB2 clearly does not support every aspect of the transition. But it does promote a software infrastructure that is conceptually viable and with which users can walk until they get past the crucial transition stage. IBM is attempting to give many installations what amounts to a semi-integrated software vehicle, with IMS and DB2 as the "engine." The trip across the bridge will be a difficult one. Particularly in the next two to four years, the question "when DB2" will outweigh "if DB2," as users view the new DBMS as both an architecture and a strategic IBM product.

DB2's uncertain role

Whether IBM's positioning of DB2 as both a complement to IMS and a stand-alone DBMS becomes clearer in terms of both marketing direction and technical development remains uncertain. Users wonder about many other details as well:

- What is a reasonable time frame within which the dual-DBMS strategy will give way to a more aggressive promotion of and a more comprehensive role for DB2?
- Are the apparent functional weaknesses of DB2 (lack of a comprehensive data dictionary facility, incomplete application development tools) being magnified by industry analysts and competitors, perhaps overshadowing the long-term architectural significance of DB2?
- Are the variety of IBM fourth-generation languages — Application Development Facility (IMSADF II), Cross System Product (CSP) Set, Data Base Edit (DBEDIT) and so on — skewing IBM users' view of SQL? After all, SQL doesn't compare with some other recognized fourth-generation powerhouses such as Information Builders, Inc.'s Focus and Applied Data Research, Inc.'s Ideal.
- Whither SQL/DS? Will the VM and MVS implementations of relational facilities continue on parallel paths? Will interactive interfaces at the data-systems level be provided between DB2 and SQL/DS? What degree of "production" processing can SQL/DS, or perhaps more importantly VM, support?
- What are reasonable performance expectations from DB2, based upon early user experience?

It is very likely that within the next three to six months, probably occasioned by an announcement of the next release, IBM will more clearly position DB2 as a stand-alone DBMS. Thus far, the majority of DB2 utilization has taken place in a Query Management Facility/Interactive System Productivity Facility (QMF/ISPF) environment. Approximately 70% of applications developed are end-user-oriented. Approximately 30% are transaction processing applications,

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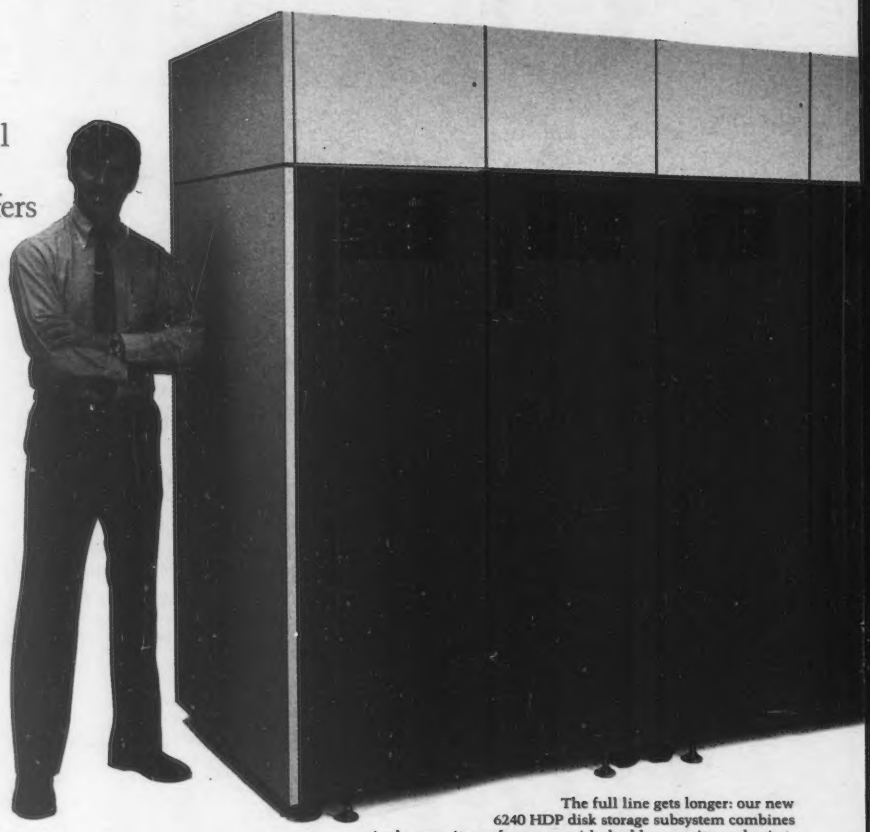

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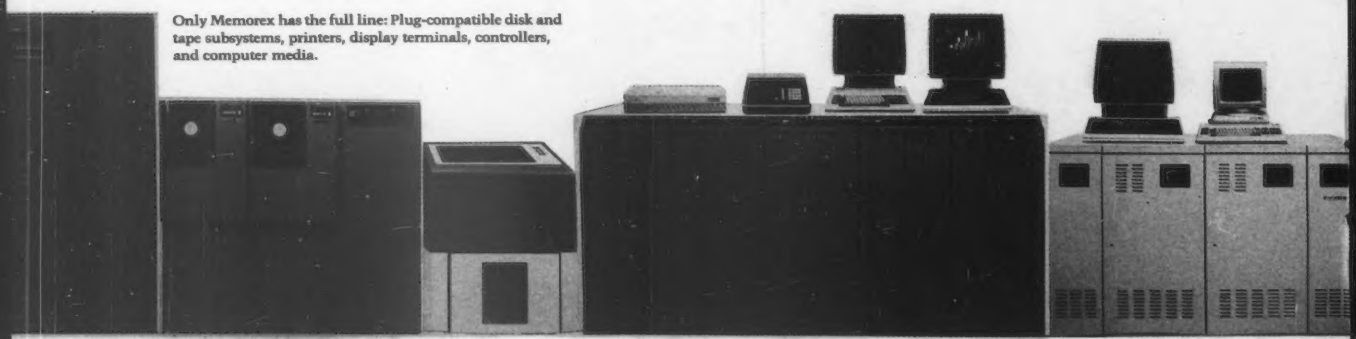

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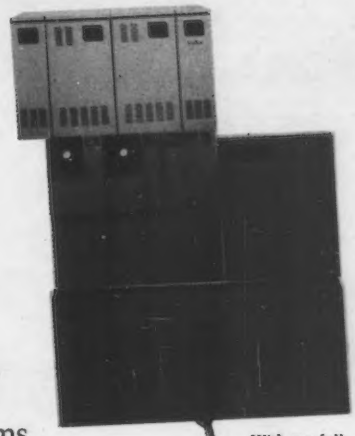

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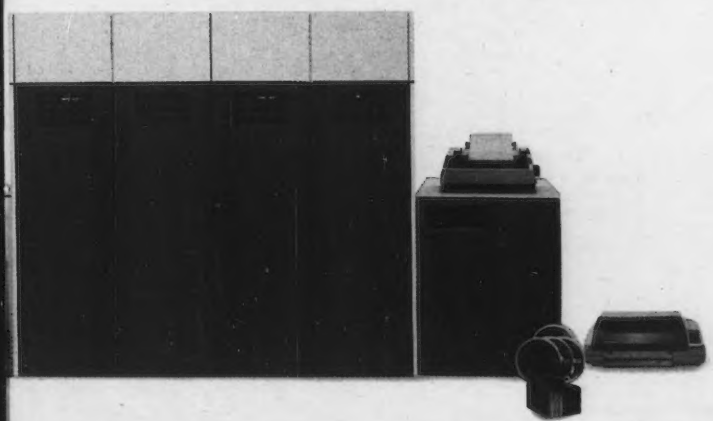

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delivered via IMS DC (Data Communications) or CICS.

The bounty of end-user applications demonstrate the viability of manipulating general-purpose "subject data bases" via a relational facility such as SQL and the feasibility of transferring varying amounts of data from the structured IMS environment to the relational DB2 environment. As IBM enhanced existing IMS Message Processing Programs, users put DB2 to work providing integrated access to select data resources.

For example, a manufacturing environment uses numerous tables for transaction processing. Very often these tables contain data that is user defined and should be user maintained, such as metallurgical codes in a steel production system.

The Cobol approach normally involves table management that requires a technician's attention for updates. DB2 lends itself more readily to end-user updates. While DB2 would be expensive if used solely as a table-management system, it does provide excellent facilities for this type of data support.

DB2 relies on SQL statements embedded in the existing program. The program defines the tables to DB2 and carries out a one-time data transfer. At execution time, the program accesses the DB2 tables via the IMS DC/DB2 Attach facility.

SQL interfaces

In a data validation situation, the SQL "SELECT . . . FROM . . . WHERE" clause navigates the table or tables. A status code is returned to the application so that it can continue processing. Via QMF, end users can now directly maintain the data.

In several installations, these "production" IMS/DB2 applications are being developed as part of a gradual introduction of DB2 that provides an enhancement capability for existing IMS systems.

The emergence of standard data definition (DDL), manipulation (DML) and control (DCL) languages is critical to the success of an integrated information environment. In the one to two-year time frame, IBM's data systems strategy will emphasize SQL in that regard.

Production IMS/DB2 applications are developed as part of a gradual introduction of DB2 that enhances existing IMS systems.

The first phase of the tactical deployment of SQL will be as a data manipulation facility, as the above example indicates.

From an end-user tool perspective, the increasing frequency of vendors' announcing "SQL interfaces" is an indication that a key interface layer (SQL) in IBM's blueprint for DB2 is becoming a de facto industry standard.

In the context of a standard data language, an extensive DDL facility is also critical. This language is closely tied to the inclusion of an integrated data directory/dictionary mechanism.

Coming clear

It is unlikely that SQL will begin to provide that component of the data language layer before two years. At that point, IBM's dictionary direction should become clearer and may even materialize into a workable product.

In the more difficult to predict 4+-year time frame, the final dimension of a standard data language layer will begin to emerge — a comprehensive data control facility that is essential for the distributed data access and data base management environment.

A program is now under way to implement major subject data bases in DB2 with application processing delivered via DB2/SQL, SQL/DS, Oracle and several other excellent fourth-generation languages, primarily Focus.

Continued on page 64

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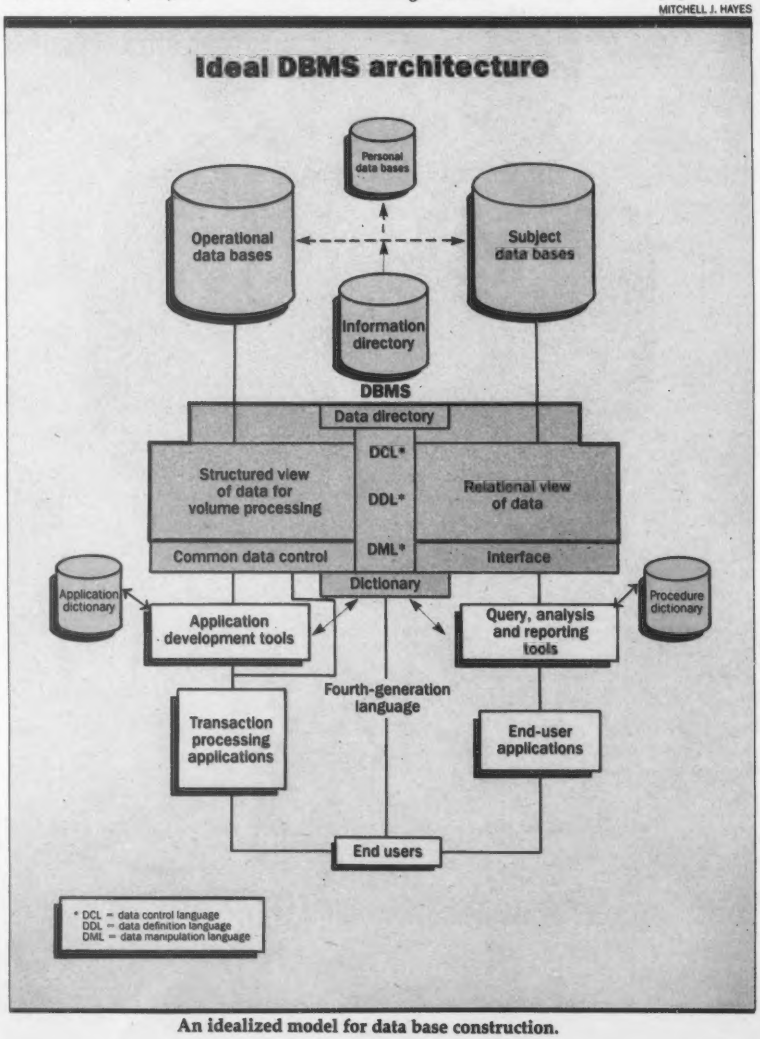


An idealized model for data base construction.

How fast can IMS process?

Is the positioning of IMS by IBM as the "structured, volume transaction processing" data base system working?

Installations are experiencing continued increases in the volume of on-line transaction processing. The following figures are offered as arbitrary, yet meaningful, transaction-per-second metrics that help in gauging the size of a transaction processing environment:

The medium category (five to 25 transactions per second) includes a significant number of the medium to large IBM mainframe shops. The large category (25 to 100 transactions per second) is increasing. By 1990, a substantial number of installations will move into the 100+ transaction-per-second range.

There is a strong industry bias that suggests that IMS will not perform well in the high-volume environment. To the contrary, Releases 1.2 and 1.3 have made IMS' voracious appetite for resources more acceptable as its ability to support increased volumes has improved.

An IBM benchmark, which has been independently verified, shows the following performance estimates for IMS 1.3 in an XA environment where the somewhat forgotten FAST PATH feature was employed as a high-performance option:

- Full-function mode — 85+ transactions per second.
- Mixed mode — 95 to 100 transactions per second.
- FAST PATH — 135+ transactions per second.

IMS 1.3 represents the first stage in a complete restructuring of the IMS internals that is aimed at the targets of high availability and high performance.

High performance

These numbers are in all likelihood conservative. One major banking installation is supporting a peak volume of 1,000 transactions per second. It is important to emphasize that this high volume occurs infrequently and can be anticipated within one hour. Also, the high volume involves a reduction in the rest of the IMS work load.

Nevertheless, IMS handles the volume. This type of support is also indicative of the improved operational and reliability features of the IMS software.

IMS 1.3 represents the first stage in a complete restructuring of the IMS internals that is aimed at the targets of high availability and high performance. One without the other becomes relatively meaningless.

- Is FAST PATH a design framework for restructuring IMS so that it will effectively support the high-performance environment? Or is it "vaporware" — an intuitively appealing but impractical concept?
- Will IBM find a home for the "orphan" known as TPF that won't disrupt the ongoing enhancement of IMS, not to mention the continued development of DB2? Is a DBMS facility for TPF likely?
- Can IBM achieve a separation of duties between IMS/DC (as the preferred data communications system for transactions processed by IBM DBMS) and CICS (as a general-purpose on-line application monitor)?

Release 2.1, particularly in the FAST PATH area, continues to streamline virtual storage consumption via an expanded use of the address space "above the line."

Release 2.1 also offers enhancements in the area of availability via XRF. While not a true "fault-tolerant" solution, XRF provides a "hot standby" approach where the work load of an active IMS system can be transferred to an alternate IMS system with a minimum amount of interruption of service to users.

Here we have an example where the integration of several IBM "Large System Architecture" products (specifically, MVS/XA, SNA and IMS) is an indication that IBM is still very much "large-system environment" oriented. It is very likely that XRF will be expanded to DB2 within one to two years.

IMS is here to stay. FAST PATH is, in fact, a significant component of IMS that is providing a redesign framework for many existing IMS systems that are high-performance oriented.

IMS will begin to play a more transparent role in new system development efforts as DB2 plays a more comprehensive role.

In the 4+-year time frame, it is likely that IMS will be completely positioned as a high-performance option. It may be premature to speculate, but a data base machine implementation of IMS appears to be a logical extension of DASD and operating system technology developments. In any event, IMS will continue to require the resources present in a 3090 class MVS/XA system.

From an IMS perspective, two items are potential obstacles for IBM if the above is an accurate description of its DBMS strategy in the next two to four years and beyond. Those items are CICS and TPF.

Release 1.7 of CICS quieted any fears that a move away from CICS was being contemplated by IBM. Ironically, for non-DBMS reasons, IBM is tied to CICS.

A mainframe product for the office systems environment — the Distributed Office Support System (DISOSS) — requires CICS. DISOSS is being widely used in large mainframe shops and has become a strategic IBM product from an overall perspective.

It is likely that IBM will attempt to emphasize one data communications system as a front end for its DBMS products. That system will be IMS/DC.

CICS support and development will continue, at least, into the four- to six-year time frame and will increasingly be positioned as the general-purpose, on-line application monitor. Extraneous items, such as the DOS/VSE user community and the large number of non-DBMS CICS applications in existence, further mandate an IBM version of the integrated software architecture that is unclear about the preferred IBM data communications solution.

A data base machine implementation of IMS appears to be a logical extension of DASD and operating system developments. IMS will continue to require the resources present in a 3090-class MVS/XA system.

The orphan

TPF is less of an obstacle. Currently, it is an orphan within IBM and most likely will not find a home. Twelve to 18 months ago, quite a few large installations began looking seriously at TPF. The user population grew rapidly from its original base of less than 50 to approximately 60 to 70 locations. Industry estimates suggested a total user community of 200 sites was possible.

As organizations moved resource-intensive, high-volume systems into RPF (and in several cases out of IMS), processing efficiency did improve greatly. But general accessibility to data became a problem, since there were no fourth-generation language facilities provided by TPF itself or interfaces to it provided by existing fourth-generation languages.

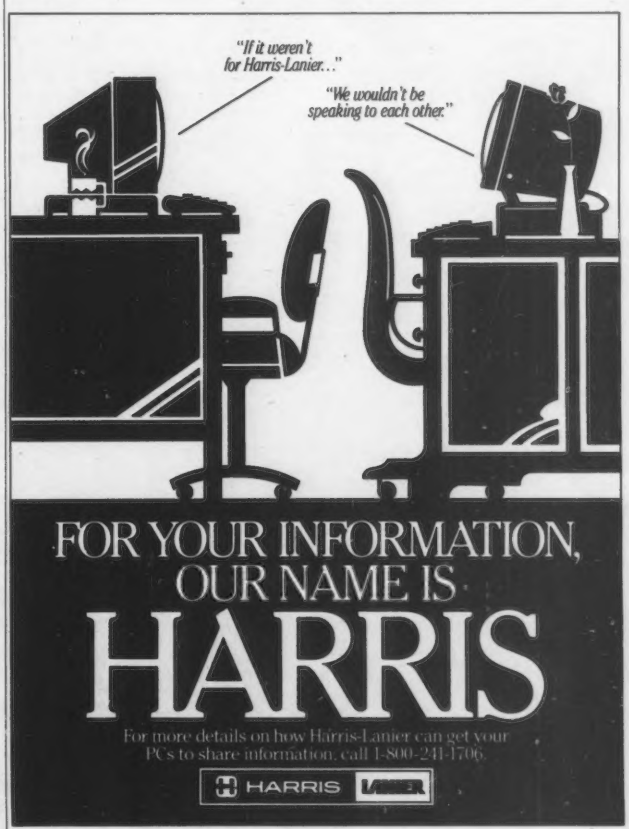
For some, the TPF environment became a no-man's-land. The lack of a DBMS facility under TPF has driven several recent converts back to a conventional environment.

TPF will remain an extremely high-volume environment approach. A TPF front end for transaction routing and network interfaces is a viable concept. It is unlikely that IBM or any other vendor will provide a complete DBMS implementation within TPF. It is likely that facilities such as Swissair's ACP/DB, an IMS/TPF interface, will be developed.

Currently, IBM is investing more in IMS development than it is in DB2 development by 3:2. This ratio will change. In restructuring IMS and positioning it as the structured, volume transaction processing system, IBM is providing itself with a means in which the evolution of DB2 can continue.

In all likelihood, IBM will be able to address more effectively the distributed environment with the demands of referential integrity, locality of reference and site autonomy, to name just a few key characteristics, once the foundation is established firmly.

In IBM's strategy, DB2 will become the focal point, with a specific role for IMS in the dual-DBMS approach.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Continued from page 62

Much of the data being managed by DB2 is drawn from operational IMS transaction handling systems. These systems will be very carefully migrated to the DB2 environment over four to six years, with some remaining permanently in IMS.

From an industry perspective, the long-term significance of DB2 is being overshadowed by industry analysts and consultants with a "David and Goliath" mentality. The David camp focuses on the dictionary and fourth-generation language weak spots of DB2, suggesting that IBM's — the Goliath's — urging to consider the dual-DBMS approach is misdirected and ill fated.

But there is a need to examine more carefully the methodologies needed to make the transition to an information-based system. Beneath the surface of early DB2 experiences there is an important caveat that should be expressed as forcefully as those concerning functional and performance constraints in DB2 or any version of the integrated software architecture.

From an implementation perspective, the importance of using data analysis and modeling as critical application planning and design procedures has finally come to the surface. This emphasis resulted from experts' recognition that a relational DBMS such as DB2 can be more forgiving of quick-and-dirty design solutions.

The notion that relational systems, because of their flexibility, minimize the need for data design is misleading and can be downright dangerous. Whether Goliath's intention was to reinforce the importance of data-oriented design remains open to question. The fact is that major installations are recognizing that maintaining a corporate architecture as a planning, design and implementation framework shores up the relational approach in general and a DB2 effort in particular.

In fact, several major installations initiated data architecture projects before DB2 was an issue. One major banking institution employed a relational data modeling method, which was applied to a functional area of the bank that was information intensive but had thus far been ignored by information technology.

During the first stage of the effort involved, MIS gathered a user-driven definition of data requirements. The second stage involved pilot implementations of relational applications using Oracle Corp.'s Oracle on a Digital Equipment Corp. VAX and SQL/DS on IBM VM processors. As pilot applications were delivered, MIS brought in DB2 as a subject data base coordinator to provide a corporatewide data repository.

The notion that relational systems, because of their flexibility, minimize the need for data design is misleading and can be downright dangerous.

Four major issues

Two central issues and two peripheral issues underlie the overall context of IBM's DBMS strategy.

The central issues are the performance and resource implications of DB2 and the future of IMS. IMS' future will be discussed in the context of IBM's data systems strategy for the 2-to-4 and 4+-year time frames.

The peripheral issues include the relationship of the VM SQL/DS product to DB2 and IBM's fourth-generation offerings.

First, the peripheral issues. In terms of VM SQL/DS' relationship to DB2, SQL/DS preceeded DB2 as an IBM relational facility. IBM clearly intended that the two environments (MVS and VM) have a high degree of compatibility in terms of data system products. It is unlikely that in the one-to two-year timeframe that better, dynamic interfaces between DB2 and SQL/DS will be provided.

The use of SQL/DS as a data management facility for VM-based end-user processing is a viable consideration. But the delivery of production applications via SQL/DS should be approached very cautiously, stemming more from the characteristics of VM architecture than from SQL/DS capabilities as an integrated application support mechanism.

The two products very likely will continue on a parallel development course in the next two to four years. Beyond that, the future direction of

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VM will dictate the direction of SQL/DS.

The fourth-generation language layer is important to productive application development and effective user processing. Admittedly, finding a precise definition of a fourth-generation language — beyond a frustrated cry of "Not Cobol!" — is difficult at best.

IBM's information generator offerings are weak — there are few products.

The distinction between tools for the technician (application generators) and for the business user (information generators) provides a solid background for discussing capabilities and representative products.

Without being unnecessarily harsh, IBM's information generator offerings are weak. For one thing, there are few products to date. Those that are available — The Information Facility (TIF), Information Center One (IC1) and the Application System (AS) — are *not* competitive with products such as Focus, Analytica/Mathematica's Ramis II, D&B Computing Services' Nomad2 and so on.

IBM's weakness

As the vendors of these and other strong products develop SQL interfaces, IBM's weakness in this area could get worse before it gets better.

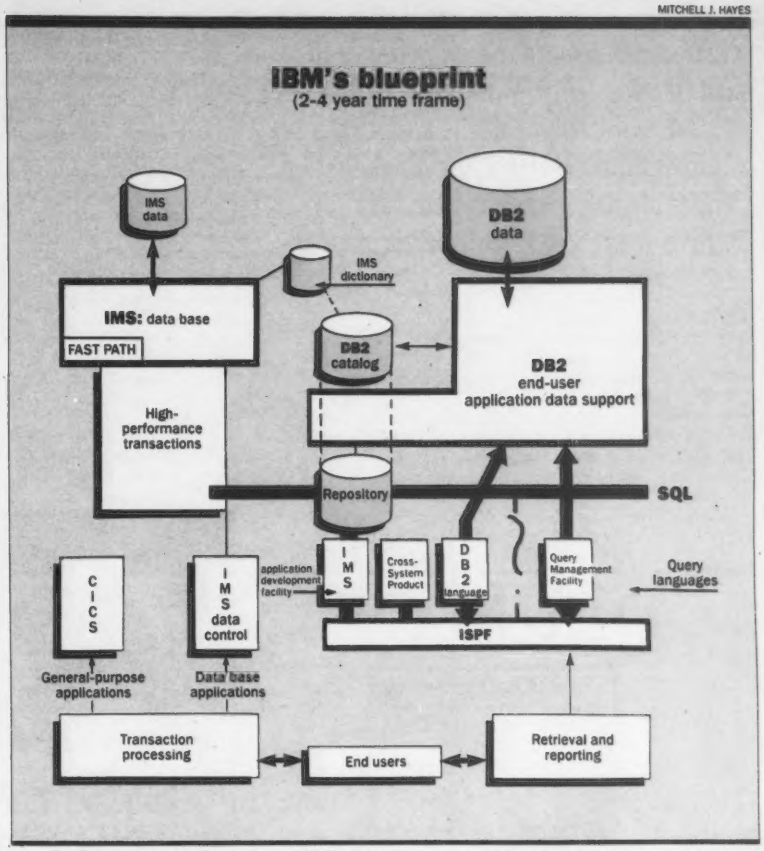
There is one notable exception in the context of mainframe-Personal Computer interfaces. IBM's Host Data Base View (HDBV) product provides an effective interface that employs common facilities for data definition and transfer (QMF and SQL). HDBV will likely be enhanced further by IBM.

For application generators, IBM offers IMSADF II, CSP and DBEDIT. SQL is not on this list; users have spent more time figuring out if SQL was IBM's fourth-generation language than they have looking at these products, perhaps with good reason.

Of the three, only IMSADF II represents a complete application development system. Past problems with it linger in the form of a strong bias against the product. While not as powerful as Ideal, for example, it does represent a viable alternative within the IBM product family.

Suffice it to say that the fourth-generation language marketplace is still evolving

MITCHELL J. HAYES



In the next two to four years, IBM's DBMS plans may include a central repository.

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Real storage configuration becomes the central issue when considering DB2 resource allocation and the attendant throughput potential. The placement of certain elements, such as data base buffers, is the key to DB2 performance.

and that IBM is trying in this area, but it has not yet provided truly effective development tools to complement DB2. This could become a serious inhibitor for potential buyers that are attracted to DB2 but that need to develop a great many applications in the short term.

Already, one major manufacturer with a significant investment in IMS — ADR — has chosen a non-IBM-integrated architecture for its development capabilities.

Another IMS installation has looked to the "complete software solution" marketed by Cullinet Software, Inc. as an intermediate approach to data base management in lieu of DB2. Interestingly enough, both installations intend to keep a watchful eye on DB2, particularly in terms of its performance potential.

What is acceptable performance to one installation may be horrendous to another. With that disclaimer, the following observations about the central issue of DB2 performance and resource consumption are offered.

In the most general terms, DB2 appears capable of supporting a maximum of 20 transactions per second delivered via IMS/DC or CICS. A range of five to seven transactions per second appears to be readily achievable, based on installation benchmarks of DB2.

Performance under ISPF is more difficult to estimate. Of course, the workload composition of a DB2 transaction or ISPF interactive session will vary widely. Perhaps a more meaningful analysis is the resources that DB2 requires to operate.

Storage tradeoff

DB2 developers recognized the virtual storage constraint that has become the curse of many IMS installations and made every attempt to avoid that problem. In fact, they replaced it with the consumption of real memory.

Real storage configuration becomes the central issue when considering DB2 resource allocation and the attendant throughput potential it implies. The placement of certain elements, such as data base buffers, becomes the key to maximizing DB2 performance.

In the transaction processing area, where installations are handling increased volume, IBM is positioning IMS as the structured, volume transaction-processing data base system. This role for IMS should be completely realized in the 4+-year time frame (see story, page 63). Concerns over DB2 performance and resource consumption are not unfounded but appear to be manageable. DB2 is clearly, however, an MVS/XA-oriented product.

In the next one to two years in particular and most likely in two new releases of DB2, IBM will bolster performance and streamline resource consumption.

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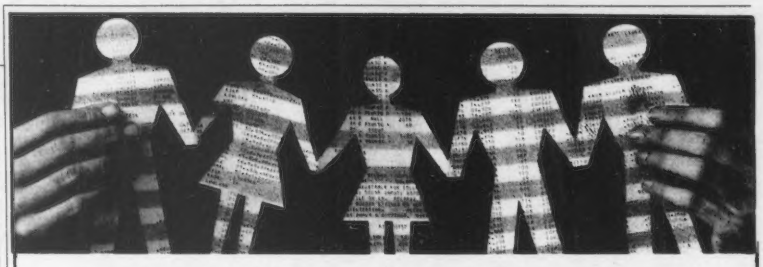

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Make no mistake about it, DB2 is a large systems environment product. In that environment, IMS DB/DC remains a vital complement to DB2 when high-volume transaction processing is required.

Both products will continue to benefit from advances in memory management, such as extended memory of the 3090 and storage management within MVS/XA. Multiple-address space architectures will receive continued emphasis and will leverage the expanded CSA (Common Services Area) and cross-memory service capabilities of MVS/XA.

Improved data integrity features are also necessary. Data integrity is tightly linked to the issue of maintaining a data dictionary. Most likely, subsequent releases of DB2 will expand the role of the DB2 catalog as one step in the direction of an integrated, active repository of data and application descriptions.

By design, DB2 will mature very quickly but will not replace IMS.

As a DBMS product, DB2 will mature very quickly and will not, by design, replace IMS. The degree to which DB2 complements IMS will vary from one installation to the next.

Not going with DB2 now does not appear to be in any way a bad decision. Particularly in the one- to two-year time frame, alternative approaches will be more effective in some installations. But DB2 does encourage an analysis of a corporation's overall information architecture.

Using DB2 successfully requires serious attention to the planning and design of an integrated, data-driven systems environment. At the implementation level as well, the relational capabilities of DB2 do not eliminate the need for a thorough understanding of the data base approach.

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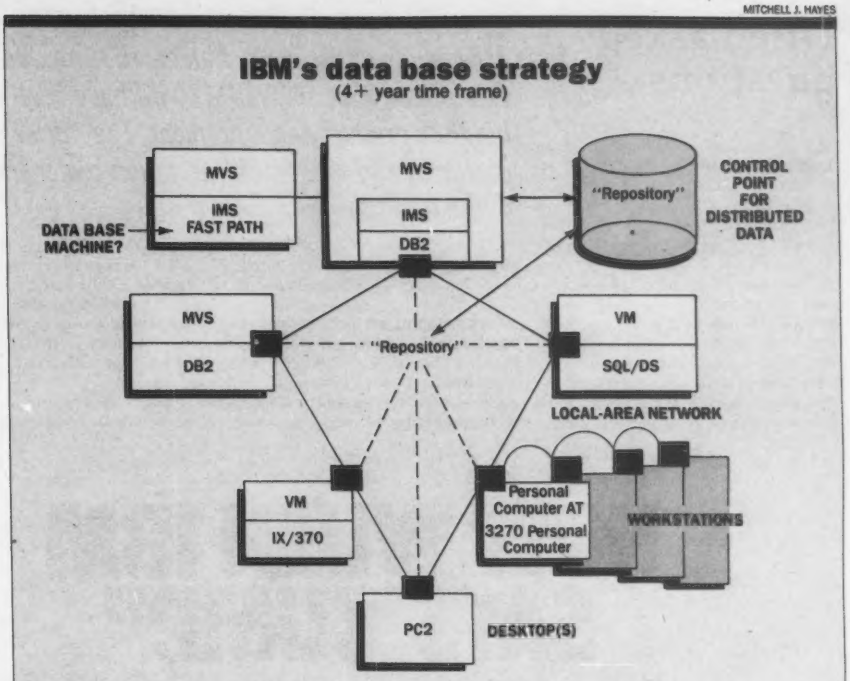

By four years from now, IBM's DBMS strategy will focus around a data repository for all systems.

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Often asked questions

DB2 is one of the most strategic IBM products ever released. Perhaps IBM could have been clearer in DB2's product announcement. The initial positioning of it as an "information center DBMS" will haunt IBM for a short time.

Is DB2 the only alternative for an IMS installation?

Obviously not. Applied Data Research, Inc. (ADR); Cincom Systems, Inc.; Cullinet Software, Inc.; and Software AG of North America certainly don't think so.

However, it is imperative in the next one to two years for installations selecting a non-IBM complement to IMS or a replacement for it to monitor closely the continued integration of mainframe, operating system and direct-access storage device technology to ensure that a particular integrated software architecture is configured to take advantage of enhancements.

Will an automated facility emerge to "translate" existing IMS systems (not just data as with DXT (Data Extract Facility) or data bases as with ADR's DL/I transparency concept) to another DBMS environment? Isn't it to IBM's advantage to provide such an IMS-to-DB2 migration facility, or is IBM waiting for an entrepreneurial group to provide it?

It appears that IBM does not see the existence of such a facility as a matter of necessity.

ADR's transparency is probably the most promising — if yet fully unproven — migration aid out of IMS and into an integrated software environment. DXT will be enhanced but not to any significant degree.

Is it unreasonable, if not pretentious, to consider DB2 an integral component of IBM's long-range, large-system architecture with the overall data systems importance that is equivalent to Extended Architecture (XA) for operating systems and Systems Network Architecture (SNA) for communication systems?

No. DB2 is one of the most strategic IBM products ever produced. Perhaps IBM could have been clearer in its product announcement. The initial positioning of it as an "information center DBMS" will haunt IBM for a short time.

In what direction will IBM's data base strategy evolve next?

There are clearly major weaknesses in DB2. In terms of performance, access-path optimization must be improved and should involve a fair degree of "automatic" optimization at execution time to minimize the need for rebinding applications to data bases.

Most of the data necessary for access path selection and optimization is already present in the catalog. Furthermore, the automatic creation of indices when needed would be a useful capability.

The DB2 catalog must become more active in data validation and in data-structure integrity. Better cross-referencing of views to base tables and more control over logical relationships between the same data that appears in two tables is needed.

How will R* fit into IBM's DBMS plans?

IBM is preparing to push into the distributed environment with data system products. Within the past year, IBM has begun discussing R* (pronounced R star) openly. R* is the successor to the somewhat mystical System R research project that followed Edgar Codd's pioneering work that created the relational model.

Once anticipated as a replacement for IMS, System R actually spawned a series of requirements for large-system data base management. In fact, many of these resulted in improvements and/or new facilities in MVS and its various subsystems as opposed to being DBMS enhancements only.

It is likely that R* will have a similar impact. It will provide a design framework within which practical solutions to the problems of locality of reference and referential integrity can be implemented. Unlike System R, however, R* will more likely than not emerge as a program product itself.

When will R* be released?

As a first-stage product, probably within four years. The prototype currently running provides both present and future insights into IBM's strategy. This prototype, which is MVS- and CICS-based, utilizes QMF (Query Management Facility) for user interface and SQL for data manipulation.

Eventually, a copy of R* will run on most IBM hardware devices. It must be emphasized that significant research remains to be completed before an R* implementation is feasible.

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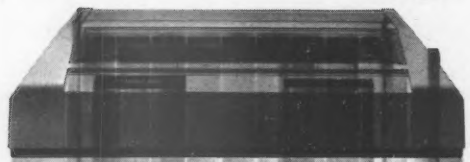

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3090

There's more to come after Models 200 and 400

By Edward Wagner

By mid-1986, IBM is expected to announce two single-processor models below the 3090 Model 200 and a third line midway between the 200 and 400.

IBM introduced the first models of its long-awaited 3090 mainframe series, Sierra, during the first quarter of 1985. But while the mystery is over, the waiting is not. The major performance boost users anticipated will not appear until the more powerful Model 400, now promised for the last quarter of 1986, is shipped.

By the early 1990s, IBM expects its typical large user to have installed 1,000 million instructions per second (MIPS) processing, 10G bytes of system memory and 6,000G bytes of disk storage. Currently, a typical installation includes 100 MIPS processing, 200M-bytes memory and 300G-bytes disk storage. While recognizing this great demand for increased capacity, IBM announced the delay in delivering the quadratic 3090 Model 400 processor, saying that it doesn't have the resources to test the Model 400 and dyadic Model 200 at the same time. Apparently, IBM announced the 3090 Model 400 to gauge customer reaction, even as it continues to try selling the now dead-ended 3084 processors.

Laying the groundwork

The 3090 dual and quad processors offer performance into the 50 MIPS range. The new mainframes utilize the same chip technology as the 3080 processors — with the addition of emitter-coupled logic (ECL). But the 3090 announcement is viewed as IBM's groundwork for certain to-be-announced expansion capabilities beyond the designs IBM has previously included in its 360 and 370 mainframe technology.

Viewed as a major enhancement is the use of system memory (up to 128M bytes) as a holding area for virtual pages. By reducing disk I/O activity, this added system memory will boost throughput for high-volume interactive applications.

It appears that, true to form, IBM already has built into the 3090 processors significant

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Edward Wagner is president of Applied Management Services, a computer technology research firm in Patchogue, N.Y. AMS recently published the 76-page "Inside Sierra Report," examining IBM's Sierra product line, its future and implications for users.

unannounced capabilities, including 6M-byte I/O channels. The increased use of microcoded functions in the 3090s will make life difficult for the plug-compatible manufacturers rushing to develop 3090-type processors.

The latent capabilities of the 3090s fuel speculation, yet users must deal with the machines available today. IBM emphasized the commercial and scientific/engineering powers of the 3090s, but many users were not impressed with the initial capabilities of the new processors.

Vector processing

However, in early October IBM unveiled the vector processing extension. This new feature will perform at approximately 15 million floating point operations per second (MFLOPS), which positions it at the low end of the scientific supercomputer market.

The 3090 series appears to complement the low end of the 3080 product line. It is IBM's hope that current 3080 users will move up through the line, thereby prolonging its life. When they reach the top of the line, they will move to the 3090 processors.

The 3090 vector processing extension offers no new capabilities beyond raw power, but IBM claims that it will run Fortran and Cobol applications 1½ to three times faster than a 3090 without vector processing.

Based on benchmarks that rate the standard 3090 Model 200 processor at 7 MFLOPS, one can predict the vector processing should provide a range of 10 to 21 MFLOPS, depending on the application. IBM has provided new software compiler capabilities to facilitate the vector extension. Users also are able to take advantage of vector-enhanced upgrades of the MVS/XA and VM/SP HPO operating systems.

While the 3090 vector announcement still leaves IBM without a full-blown supercomputer in its product line, the move clearly indicates the company's formal entrance into the growing scientific/engineering supercomputer marketplace. IBM has scheduled first shipments of the 3090 facility for February 1986. The purchase price is $370,000 for the first facility and $230,000 for an additional one.

Two facilities can be housed in a frame that adds only 20% to the footprint of the 3090 unit. A frame with one or two vector facilities can be added to the two-engine 3090 Model 200. Two frames holding as many as four vector facilities can be added to the four-engine 3090 Model 400.

IBM claims that the long wait for the 3090 Model 400, which doubles the power of the Model 200, gives users time to plan. IBM is hoping that users structure their primary mainframe plans around the 3090 series and its potential capabilities. At the same time, it wants users to continue to include the 3080 processors in their plans.

Buying dilemma

On the surface, users face two choices within the IBM product line. Either they can buy a 3090 Model 200 and plan to upgrade later to a 3090 Model 400, or they can buy another 3080 processor now at IBM's newly reduced price (roughly $6.2 million) and purchase a 3090 processor later, when additional capability is required.

A basic 3090 Model 200 costs $5.3 million for the central electronic complex. Upgrading from the Model 200 to the Model 400 will cost an additional $4.3 million, while outright purchase of a Model 400 is $9.4 million.

Looking at prices another way, prior to the 3080 price reductions, a 16M-byte 3081KX provided processor price/performance of $208,000 per MIPS. The 3090 Model 200 costs only $182,000 per MIPS, while providing four times the capacity and a greater number of channels.

Users pushing against the performance limits at the top of the 3080 line most likely will take the first choice and acquire a 3090 Model 200 as soon as possible. Those who can handle their work loads with another 3080 probably will take the second choice.

The 3090 series appears to complement the low end of the 3080 product line. It is IBM's hope that current 3080 users will move up through the line, thereby prolonging its life. When they reach the top of the line, they will move to the 3090 processors. High-end 3080 users have a much narrower choice to exercise in a much shorter time. They must migrate to the 3090 as soon as possible.

The dilemma that users with a 3080-vs.-3090 decision face is the danger of choosing a 3080 only to get stuck with suddenly old and hard-to-sell machines. This situation could occur when 3080 sales slow down to the point that IBM virtually kills the product line by rapid-fire announcements of additional 3090 models.

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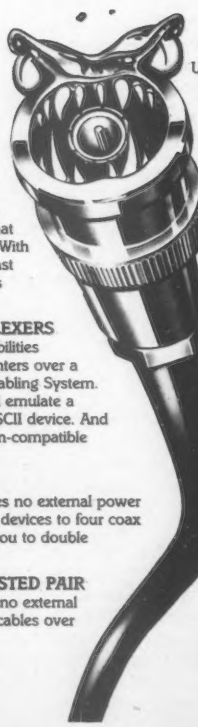

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Attention: Marketing Services Dept.

IBM had announced the 3090 with aggressive pricing, it would have hurt seriously its 1985 earnings. Most potential 3080 customers would have waited for the 3090 models (or not proceeding with the purchase of their installed 3080 machines). To protect its credibility with its large users, IBM had to structure the 3090 announcement to provide something for everyone.

The potentially strong impact of the 3090s was deliberately blunted by the announcement at the same time of VM/XA, E/S, Unix, Fortran and the 3044 Fiber-Optic Channel Extender Link. To downplay further the announcement and to extend the life of the 3080, IBM cut prices of the line by 5%, memory increments by 23% and maintenance by 10% to 15%. Inherent in the 3090 announcement was IBM's hope that users continue to purchase 3080 processors.

IBM designed its pricing of the 3090 to encourage purchase by users while discouraging short-term leases and rental agreements. This strategy is evidenced by the unprecedented purchase-to-net rental ratio of 12.2:1 for a basic 64M-byte model 3090 Model 200.

It is difficult to ascertain the specific price per megabyte of memory for the 3090, since the central memory is integrated with the processor complex. However, an expanded storage module costs $7,400 per megabyte for 64M bytes and $5,600 per megabyte for the next 64M bytes.

These prices reflect a significant improvement when compared with 3080 prices of $12,500 per megabyte. IBM's expanded storage capability transfers data to and from the CPU in 4K-byte blocks.

Prices for 3090 maintenance also have a significant advantage. The 3090 Model 200 maintenance is $5,900 per month, while the 3084QX with nearly equivalent performance carries a maintenance charge of $7,090 per month.

Improved price/performance

Analysis shows that the 3090 provides far greater price/performance than the 3080 series. IBM made major changes in design, architectures and software. To reach meaningful price/performance conclusions, users must measure transaction rates, system performance and overall throughput. The system performance factors related to the new 3090 series include the following:

- A new Fortran compiler.
- New engineering and scientific instructions.
- Expanded storage capability.
- Faster processor cycle times.
- VM/XA and MVS/XA's greater use of 3090 architectural design enhancements.

Effective throughput of the 3090 Model 200 is rated as 1.7 to 1.9 times the internal rate of the 3081KX for commercial work loads using MVS/XA. It is rated 1.9 to 2.9 times the internal rate of the 3081KX for engineering/scientific work loads using MVS/XA. IBM claims that the 3090 Model 400 will provide 1.7 to 1.9 times the instruction execution rate of the 3090 Model 200 in single-image mode.

Changing the rules

The announcement of the 3090 series of processors made it quite clear that MIPS can no longer be considered the primary measurement criterion of processors. Many instructions in the 3090s are now high level and are implemented in microcode or hardware, thereby overlapping other functions.

While most industry observers continue to focus upon raw MIPS comparisons, the major advantage of the new 3090 models is IBM's new chip technology.

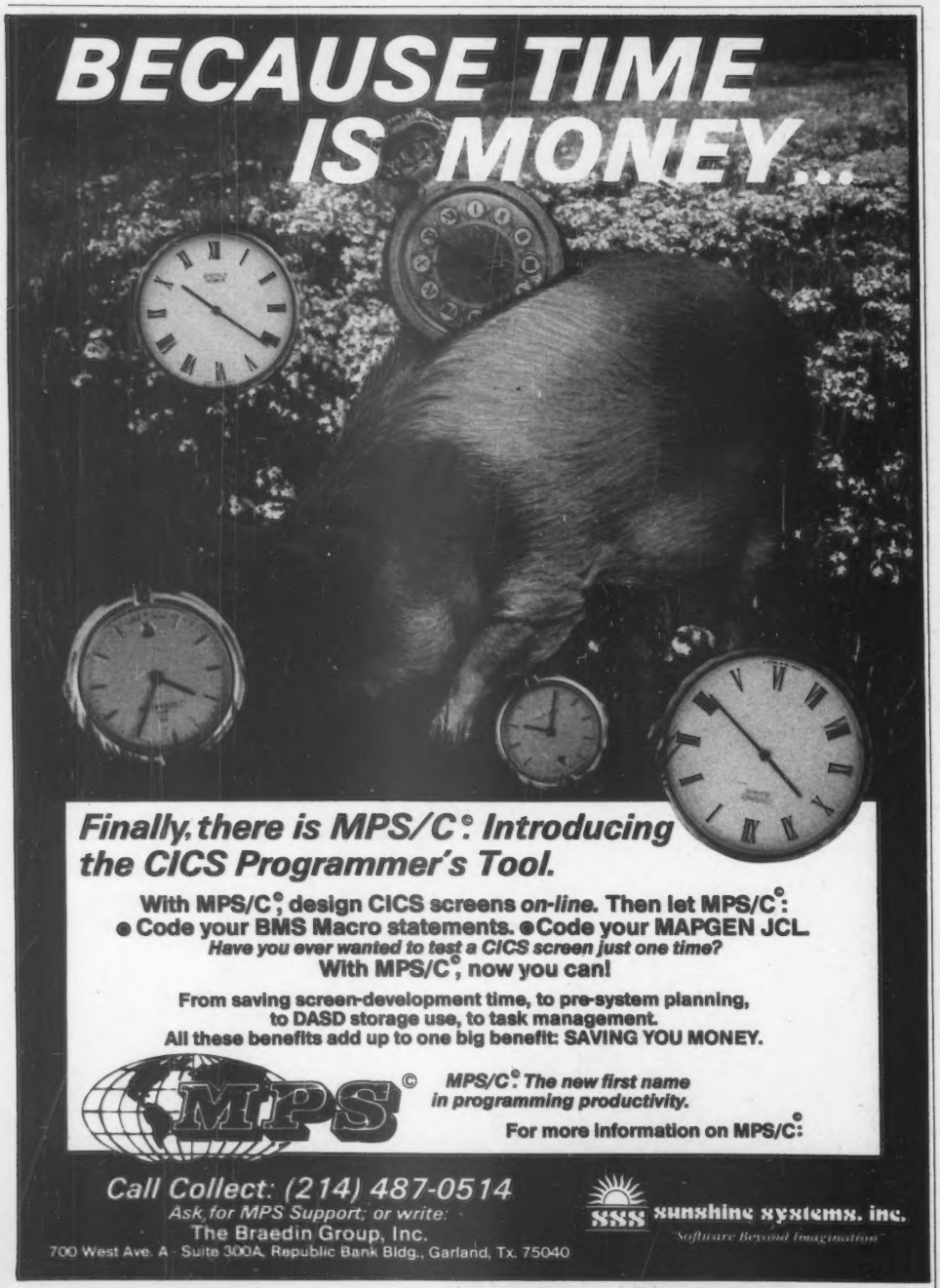
The new 3090 models use the same basic thermoconduction module, adding faster emitter-coupled logic processor chips within the devices. Processor cycle times have improved only from 24 nsec on the 3081KX to 18.5 nsec on the 3090 Model 200, but this probably means that IBM will announce faster circuits in the near future. It also means the plug-compatible manufacturers (PCM) will have difficulty keeping pace because the 3090's extended storage unit uses the new IBM 288K-bit chip.

While most industry observers continue to focus upon raw MIPS comparisons, the major advantage of the new 3090 models as compared with the 3080 series is the availability of IBM's new chip technology. The new 288K-bit chip for extended storage is available at a very low price. Up to 128M bytes can be purchased for Model 200 and 256M bytes for Model 400.

The benchmarks announced by IBM clearly demonstrate the significant effect of such huge storage sizes on real throughput, on transaction rates and on both elapsed times and response times within large networks of terminals.

Migration planning

To formulate a 3090 migration plan, users must first accept the premise that the 3090 is here to stay. This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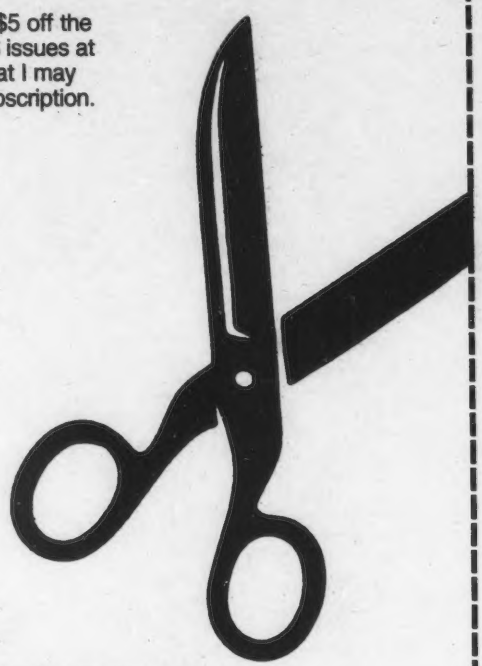

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series represents a major new computer product line on which IBM will depend during the next four years to achieve its mainframe sales objectives.

IBM learned its lesson well during the 4300 and 3080 era of new announcements. In addition to destroying 370 and 3030 residual values almost overnight, IBM embarrassed many MIS executives who had convinced their company managers to acquire 370 and 3030 machines during the months just prior to the announcements; these executives are not likely to repeat this mistake.

A second crucial factor is to understand the potential of the 3090 series and to gauge its impact upon an organization's future plans. While no specific timetable is available today, certain unannounced performance factors and functions of the 3090 series, in all likelihood, will be announced during the next 18 months.

Overall internal performance for the 3090 Models 200 and 400 is expected to increase by 20%, while the 3081KX and 3084QX will not change. Main memory capacity for the 3090 series will also increase accordingly, even as the cost per megabyte drops, significantly affecting real system performance.

The 3080 storage capacities and prices will probably not change during this period. At the same time, IBM maintenance prices will increase on the 3080 series while being reduced for the 3090 series. The 3090 channel speeds will double, while the 3080 speeds will not change. By 1987, IBM will probably announce 3380 disk drives with quad capacity to take advantage of higher channel speeds.

Prices for the 3090 Model 200 will not change, while 3081KX and 3084QX prices will be reduced in the open market by approximately 25%. Prices on the 3090 Model 400 will drop 15%, as delivery dates further improves and more machines are available.

IBM is also expected to announce three new 3090 models by mid-1986. The smallest, with a single processor, will provide approximately 1.2 times the power of the 3083JX and will be field upgradable to the 3090 Model 200. A larger single-processor, low-end 3090 will provide approximately 1.2 times the power of the 3081KX. The third new 3090 model will be positioned midway between the 3090 models 200 and 400 in performance.

Multiple processing

IBM is moving rapidly toward the concept of multiple processors dedicated to specific functions. Each separate processor will contain a large cache of storage that will function as a loosely coupled main storage facility. Microcode will control the function and performance of each processor.

In the event of failure, the processors will provide a degree of backup. Users will be able to choose different levels of fault-tolerance capabilities both at the system level and at the device and component level.

By the early 1990s, IBM's mainframe product line will emphasize modular systems consisting of high-speed processors for both general- and special-purpose environments. These mainframe systems will contain a tightly coupled confederation of processors that will provide 100+ MIPS at the high end and one MIPS for a workstation at the low end.

By the early 1990s, IBM's mainframe product line will emphasize modular systems consisting of high-speed processors for both general- and special-purpose environments.

Migration issues

There are a number of critical issues that users should consider in terms of migrating to IBM's 3090:

- Additional investment in 3080 technology should be carefully reviewed and avoided where possible. The 3080 cannot be field upgraded to the 3090 and therefore will decline in value rapidly.
- Users must consider the functional changes that the 3090 contains. Of great importance is real system price/performance not only raw MIPS.
- Sites with especially technical applications should benefit from the enhanced scientific/engineering power of the 3090 offered by the now-available vector processing extension.
- The total combined life-cycle cost, including maintenance, floor space, upgrades and future enhancements, must be analyzed.
- The purchase: rental ratios for the 3090 series are unprecedentedly low for an IBM product.
- Delivery schedules for the 3090 Model 400 will improve dramatically.
- Non-MVS/XA shops should seriously plan for MVS/XA if they hope to move toward 3090 technology.

The true 3090 series will become more visible by early 1986. Models 200 and 400 represent the tip of the iceberg. Users should formulate their 3080 vs. 3090 plans as quickly as possible.

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What's hidden, what's not

Buried among the new hardware enhancements of the 3090 are the beginnings of a more modular operating system architecture. Once again, what IBM has hidden under the covers is more important that what has been officially announced.

Embedded but not announced in the 370 product line was virtual memory. Even more dramatic was 31-bit extended architecture (XA), which was included in but not initally announced with the 3080 series. Can there be any doubt that the 3090 contains unannounced but built-in potential for being far superior to the 3080 product line?

IBM is known to be working internally on a conceptual level with a product known as XAA. This new concept centers on implementing new microcode support — or "assists," as IBM has called them — to its XA capability.

By the use of such assists and a corresponding off-loading of MVS/XA components into specialized support processors, IBM is expected to cut its operating systems overhead in half. At the same time, the relative internal performance, in million instructions per second (MIPS), of the 3090 base processor would almost double.

IBM already demonstrated the success of this approach by doubling the performance of 3080 sorts by microcode assists to a new sort algorithm called DFSORT Release 7. IBM also worked through the new XAA level to microcode its I/O dynamic path reconnect software, thereby producing a further reduction in operating systems overhead.

The above moves are considered minor compared with the main objective: off-loading large portions of MVS/XA into numerous support processors and other subsystems. XA was designed with the internal capability of handling over 200 processors or subsystems. In fact, IBM has developed two kinds of support processors: CPU support processors and channel-group processors.

IBM's new 3090 processor controller, Model 3092, is also significant. This highly intelligent and autonomous I/O process controller contains its own built-in reduced instruction set processors. If these processors can emulate the full 370 instruction set, IBM will be able to pull large portions of MVS/XA and run them on the 3092, thereby freeing up CPU cycles.

To begin this process, IBM will offload all 4,000 I/O path-length instructions to the 3092. IBM most likely has completed microcoding XA's first-level interrupt handler, which will reduce total instructions from 50 to one and processor cycles from over 300 to 70. The new microcode will be run on the 3092 processor controller.

That you cannot construct a modular architecture without using a modular operating system is readily apparent. MVS/XA must be recast into simpler portions from its present complex monolithic structure. IBM has already stated that new releases of MVS/XA will begin to arrive in 1986. These releases will move in the direction of supporting both an increased CPU channel-to-disk data rate of at least 4.5M byte/sec. and an autonomous 3092 processor controller.

3090 performance factors

Capability	Announced	Potential
Processor speed (Mips[1])	29-52	15-100
Integrated number of processors	2-4	2-8
Shared central storage (M-bytes)	64-128	64-256
Expanded storage (M-bytes)	64-256	64-512
Machine cycle time (Nsec)	18.5	14.5
Integrated channels	32-96	32-160
Channel speed (M-bytes)	3	3-6
Scientific/engineering array/vector processor (Mflops[2])	15	More powerful vector facility (25-100 Mflops)
VM CMS	Little change	VM/XA with CMS production capability
MVS/XA	Little change	More modular concept (MVS/XAA) off-loading major portions of MVS/XA to support processors
3080/3090 linkage	Loosely coupled configuration	Tightly coupled configuration (single image)

[1] Million instructions per second.
[2] Million floating-point operations per second.

Source: Applied Management Services

Figure 1

Justified concerns

The plug-compatible manufacturers (PCM) anticipate that XAA will become a reality and are justifiably concerned. The transition to MVS/XA

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was a major problem for large mainframe vendors. Users are willing to believe current claims by PCMs that they can match or surpass IBM's 3090 processor power.

But by far the most critical concern of most users is the manufacturer's ability to provide reliable XA and potential XAA capability and support. The important issue now lies in the integration of hardware and software.

A number of large installations that traditionally have been PCM-only shops are now moving back into the IBM fold for this reason. The PCM market has been reduced significantly in recent years. As IBM's XAA microcode moves closer to a reality, the PCM vendors will be in for even tougher times.

Other user concerns surround users of the current family of IBM 3080 processor family. The 3090 announcement alarms users who are concerned that the relatively new 3084QX has been rendered obsolete. They are also concerned that any further downward expansion of the 3090 family will push the other 3080X models over the hill.

The major new technical features of the 3090 series as compared with 3080X systems should be reviewed before users try to project the 3090's future capabilities. Primary features announced by IBM are as follows:

- A new hierarchy level called expanded storage, which significantly improves paging and hence the overall throughput of the system.
- Emitter-coupled logic, a new semiconductor technology for IBM mainframes.
- Major improvements in the ability of the system to continue uninterrupted operation in the event of many types of hardware failures.
- A performance increase equal to almost a factor of two in a commercial environment.
- An internal throughput rate of 1.9 to 2.9 times faster than the corresponding 3081 model in an engineering/scientific environment.

There is another critical new hardware product announced by IBM that affects the 3080/3090 relationship: the 3044 Fiber-Optic Channel Extender Link. This product, which is actually a pair of devices linked by a fiber-optic cable, allows low- and medium-speed I/O peripherals to be connected directly to processor channels up to 2 kilometers away.

Even more important, the channel extender also allows any two processors (4300, 3030, 3080 and 3090) up to 4 kilometers apart to be channel-linked using the IBM 3088 Multi-System Channel Communications Unit. These linked mainframe systems can communicate at speeds up to 1.125M bit/sec. Thus, IBM has provided the ability to mix and match 3080X and 3090 systems in a loosely coupled configuration.

Well-educated guess

In light of IBM's track record of product announcements, some fairly reliable predictions can be made regarding the unfolding of the 3090 product line.

Downward compatibility. The 3090 line will be extended downward in the short run.

Adding processors. To achieve a 100 million-instruction-per-second system by 1990, IBM would have to double the power of the 3090 Model 400. It could achieve this feat by increasing to eight the number of processors that can be tightly coupled onto a single system image.

Tight coupling. IBM must announce, prior to 1987, a multisystem coupling device that will allow 3080X and 3090 mainframes to be linked into single-machine image, tightly coupled systems.

VM/XA advances. VM/XA will become even more important during the early 3090 era. In fact, tightly coupled 3080/3090 systems as described above will probably run only under VM/XA.

The mix-and-match environment will serve most users advantageously during the next two to four years. This approach would also give IBM an edge over its competitors since users would enjoy a reduced cost of upgrading from 3080X systems to the 3090 family. The 3080X systems would be usable in state-of-the-art configurations for a while to come.

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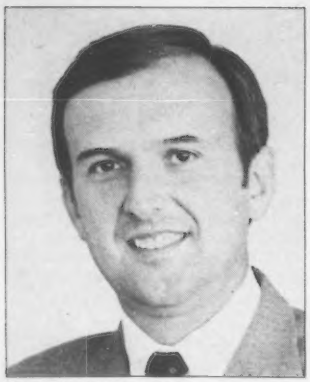

Filip: "IBM's resources are shifting to Model 400."

Interview: William Filip

William Filip is vice-president of data systems marketing in IBM's National Accounts Division. He was interviewed by Extra *Editor George Harrar.*

You have already accelerated the scheduled delivery of the 3090 Model 400 to the last quarter of 1986. What is holding back delivery?

We're just not ready yet to announce any delivery earlier than the fourth quarter of 1986.

Is it a technological or production problem causing the delay?

There's no problem, per se, at all. It's a matter of dedicating our resources and efforts to the 400 now. We had been focusing on the 200.

So has the shift of resources taken place now?

I can't speak to a specific shift of resources. You'd have to ask our manufacturing people.

I do know that with the 200 in general availability, we are now expanding our focus to the 400. We'll continue working on the 400. What happens and whether or not there is any additional improved general availability will depend on a lot of factors.

Are you taking orders yet for the Model 400?

We've taken orders for the 400 in the form of an upgrade to the 200. We have not announced the 400 as a box that we're taking orders for by itself.

When will you take orders for the 400 by itself?

I can't speculate on when or if we'll do that.

What is the cost of the basic Model 200?

The processor itself costs $4.6 million, and $5 million is the price for the central electronic complex.

What is the cost to upgrade from the 200 to the 400?

The cost is $4.3 million.

There have been reports that IBM was offering substantial discounts on the 3090, contingent upon the order being placed before the end of the year. If the quoted list price for a Model 200 with a 64M bytes of memory is $4.6 million, what would a typical discount be?

'I don't know of any instance domestically where we are taking any orders with discounts in return for orders being placed before the end of the year.'

I don't know of any instance domestically where we are taking any orders with discounts in return for orders being placed before the end of the year. That's not happening.

Would you know about it if it were taking place?

Domestically, yes I would.

There is speculation about a Model 100, a uniprocessor machine in the 15 MIPS [million instructions per second] range. If it were to come out, it would be placed squarely in the middle to upper range of the 3080 series. Wouldn't such a machine effectively kill the 3080 line?

I just can't comment or speculate on future announcements or the implication or potential impact of future announcements.

What does IBM believe its large users will require by 1990 in terms of MIPS, megabytes of system memory and disc?

That's hard to project. We continue to see growth rates in our large customers on average at or near the 40% compound rate of central processing capability. For the direct-access storage devices, we see rates of growth near the 50% compound range.

So far, our projections indicate that that rate will continue for the forseeable future. If you plot that out until 1990, it would give some multiple of current capacity.

I'd like to ask you also about future growth patterns for installations.

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If you take a typical 3090 installation as of Jan. 1, 1986, can you compare it to a typical user installation on Jan. 1, 1990?

I don't know what that would be. I could multiply out the typical growth rates. If the customer's installation were a 3090 Model 200 today — that was his full capacity within a particular data center — we could work out how many 200 equivalents or 400 equivalents in which that would result.

Can the 3090 series, given its architecture, take users to 1990? Will the power demands that IBM predicts be beyond the capabilities of the 3090 architecture?

It certainly depends on how much horizontal vs. vertical growth you're talking about. Clearly with those growth rates, you can multiply out a capacity requirement in 1990 and calculate that that's two or three or four Model 400s.

Beyond that, if you're looking for what other configurations of 3090 might exist in that time frame, we're back to the question of speculation. Right now, all I can say that there would be some number of 200s and 400s in that installation to meet the capacity requirements.

IBM is committed then to the 3090 as a series of machines that will carry the typical user into 1990?

We are committed to the 3090 as a series of machines at least numbering two — the 200 and 400. We look for the 3090 to have a long, useful life for our customers.

How long does it take to process and fill an order and install a 3090 Model 200? If someone were to order now, when would the machine be installed?

The current delivery schedule is 12 months, with 10 months possible.

What new user demands will influence the design of the next generation? What are users telling you they need or want in future mainframes?

It's predominantly more power, although with the 3090, even with the base machine and its scalar processing capabilities, we announced a relatively higher performance capability for engineering/scientific applications than for commercial applications, compared with the 3080 family.

When we announced the 200, for example, we said it was 1.7 to 1.9 times the performance capability of a 3081KX for commercial, or scalar, processing.

We've announced it as 1.9 to 2.9 times the capability for engineering/scientific applications that use the 3090's very high-speed add and multiply capabilities. That number is now 1.9 to 3.1 times; we've actually found in more recent benchmarking a higher performance comparison on the 3090.

So, more performance — yes. Continuing to grow at or near that 40% MIPS growth rate requires expanded capabilities. We get that through the 200 and 400.

The other area on which we focused with the 3090 is the engineering/scientific arena, with the scalar capability and fast floating-point capability.

Now we offer [even more capability] with the announcement of a vector facility for numerically intense applications — the ability to provide extra performance with a fully integrated vector capability within the 3090 machine.

The engineering and scientific arena is a fast growing application area with our customers; we're focusing more heavily on that arena with the 3090 than we had previously with the 3080 series.

Do you feel competitive now in the mainframe markets for academic and research applications?

We feel very competitive with the vector facility and the integration of it that gives you the scalar, vector and parallel capabilities as a two- and four-way Model 200 and 400.

For those applications where we have designed the vector facilities — those that are the predominant set of applications that we see being run in the 50% to 80+% vectorization level — we think it is a very competitive product.

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Performance	Serix/C has been designed to complement EDL and to take advantage of the rich Series/1 instruction set.

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ISPF

This Dialog Manager is hard to talk with

If "cross-system compatible" is ever to become more than a buzzword, ISPF must be made compatible with both MVS and VM through a single interpretive language. IBM may be leaning toward Rexx.

By David Chen

The new release of IBM's ISPF marks the company's commitment to develop easy-to-use, cross-system compatible software. ISPF is a tool for improving development productivity by allowing users to manipulate display and interactive application features.

Features of ISPF Version 2 Release 2, such as a Library Management Facility and dialogue panels supporting extended data streams up to seven colors, are some examples of where the ISPF team is leading the product.

IBM has also announced a new release of ISPF/PDF. Both new releases provide national language support for French, English and double-byte character sets for the Japanese Kanji alphabet, as well as features such as recursive BROWSE and EDIT commands that simplify frequently performed programming tasks.

Another known direction is the desire to use IBM's Dialog Manager as the basis for all interactive products. As IBM places more emphasis on its software market, it will position more successful products such as ISPF/PDF as standards for other companies.

Goodies and enhancements

However, ease of use may be a more reachable goal in the near term than cross-system compatibility. IBM's marketing strategy states strongly that ISPF/PDF will become compatible between MVS and VM, but there is a long road ahead before this kind of compatibility is realized.

Meanwhile, unless IBM reveals some hints of its future direction, vendors and users alike can only speculate and hope that ISPF/PDF will evolve in the same direction as user requirements do.

For ISPF/PDF to become cross-system compatible, IBM must first define which

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David Chen is PIE/TSO project manager at Technologic Software Concepts, Inc., a Tustin, Calif.-based manufacturers of software enhancement products.

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of the interpretive languages will be the standard. At the moment, CLIST on TSO is not compatible with Rexx and Exec2 on CMS. There are quite a few applications written in all these languages, so users often need to make a major conversion during a transition to another operating system.

Another source of incompatibility is the Edit macros, which have the same language restrictions — any one macro cannot be used under both operating systems.

Restrictions

Although the new release of ISPF is packaged with numerous goodies and enhancements, the panel language is still restrictive. For example, THEN logic is still assumed after the IF statement.

The new panel preprocessor option, used for compiling the panels and storing them in object format for better performance, indicates a move toward better panel language in the future; but again, there is a long way to go.

Also, anyone using the Table processing facility will complain about the problem of serialization, which occurs when more than one end user needs to access the same Table during processing or editing. If the first user queues the Table for an output function, it is locked for the duration of that operation — no other user can read it or use it in processing.

It is also a poor decision to keep Tables in partitioned data sets, since it makes each Table subject to restrictive space conditions. Hopefully, future versions will address these issues.

Library management

One of the most noticeable new functions in Version 2 is LMF. LMF is intended to be used as a development and production control facility. But the concept of controlling and auditing changes between test and production is somewhat confined when one has to follow the restrictive LMF library-naming convention. Users also have to define controls for each library manually, not generically.

One of the major questions being asked is, What ever happened to option 3.4?

Perhaps the most restrictive fact is that LMF still uses the total member replacement scheme. Therefore, it is still a manual procedure to identify and possibly delete new changes if they are troublesome.

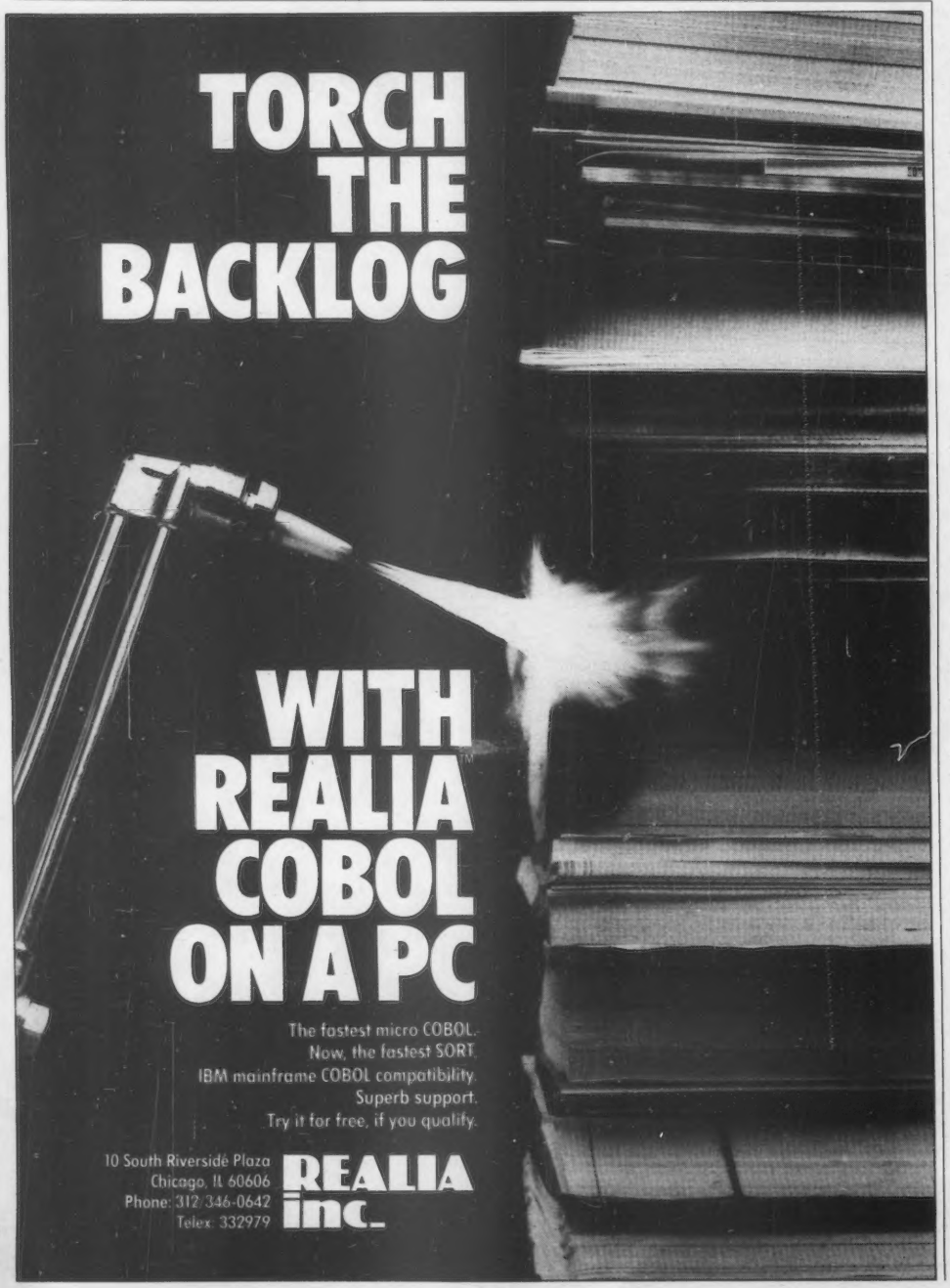
It would be highly desirable from an ease-of-use perspective if LMF could make use of the IBM Xedit or AT&T Unix Source Code Control System (SCCS) concept to separate updates from the master file.

One of the major questions being asked is, What happened to option 3.4? It used to be that users could select catalog management as the catalog option (option 4) among the utilities (option 3).

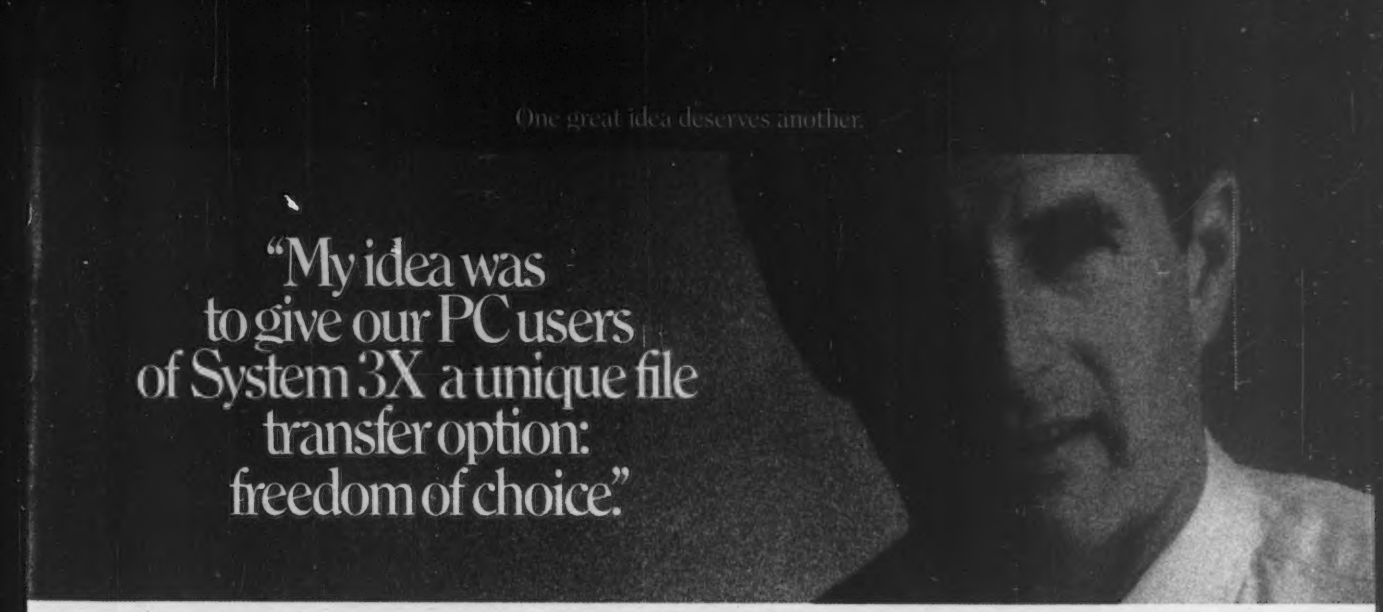
Now, the whole option has been replaced by a new file management utility, but it no longer displays a catalog management menu — only a data set management option. The idea is grand, but having to perform a separate function to list the catalog every time this option is used defeats the purpose of having a data set manager.

The concept of a master source copy of programs will also be implemented in ISPF/LMF. Each new set of changes created by an edit session will be stored in a unique update member by the editor or VSAM file. LMF will apply the changes automatically during the editing, assembling or compiling of the master program.

This is simple and transparent to the programmer; retracing or altering any new set of changes involves a



One great idea deserves another.



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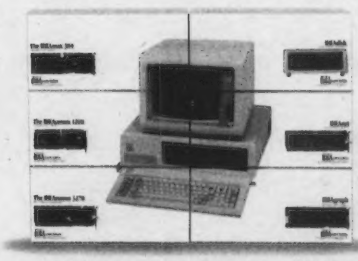

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Other enhancements will be added in the area of window management. A Help panel will no longer overlay the entire screen; instead, a pop-up window allows the user not to lose sight of the original function chosen.

simple rename or commenting out the unique member name from an update control file.

Added enhancements

Other enhancements will be added in the area of window management. A Help panel will no longer overlay the entire screen; instead, a pop-up window allows the user not to lose sight of the original function chosen.

The new 3.4 option in ISPF/PDF already has a simple window to indicate that a Listcat is in process when the operation lasts longer than a certain period of time. We will see full screen VSAM support, in which VSAM files can be edited or browsed.

What about the future of ISPF/PDF? What can we expect, and how much can we demand? Is "cross-system compatibility" just a new-wave buzzword?

Some of the newer interfaces in VM to Unix seem to suggest that the cross-system concept is here to stay and that there may even be ISPF Dialog Manager interface support in C language.

Unix strategy?

But the ISPF team has expressed a definite "no" to supporting the Dialog Manager in C. It may be that the only reason IBM allows such interfaces to exist is to allow for an eventual migration of all current Unix users to IBM hardware and software.

There must be a standard interpretive language if ISPF is to become cross-system compatible. Rexx is available on VM and on the Personal Computer XT/370, and it should also be available on MVS.

Developers speculate IBM is using Rexx internally on MVS. Rexx is a very powerful language, and its PL/I- or CLIST-like format also makes it highly desirable as a dialogue panel language.

Portable applications

It would be nice to be able to develop applications in ISPF/PDF and carry them over to another operating system without any regard to language or access method.

Currently, the common access method is VSAM. If ISPF/PDF is used as a simple data base for Table processing, it bypasses the headaches of serialization and the atrocious out-of-space condition that results from saving in data sets.

In the near future, we can expect to see quasi-partitioned VSAM data sets, the use of which should be transparent as if a user is accessing a real partitioned data set.

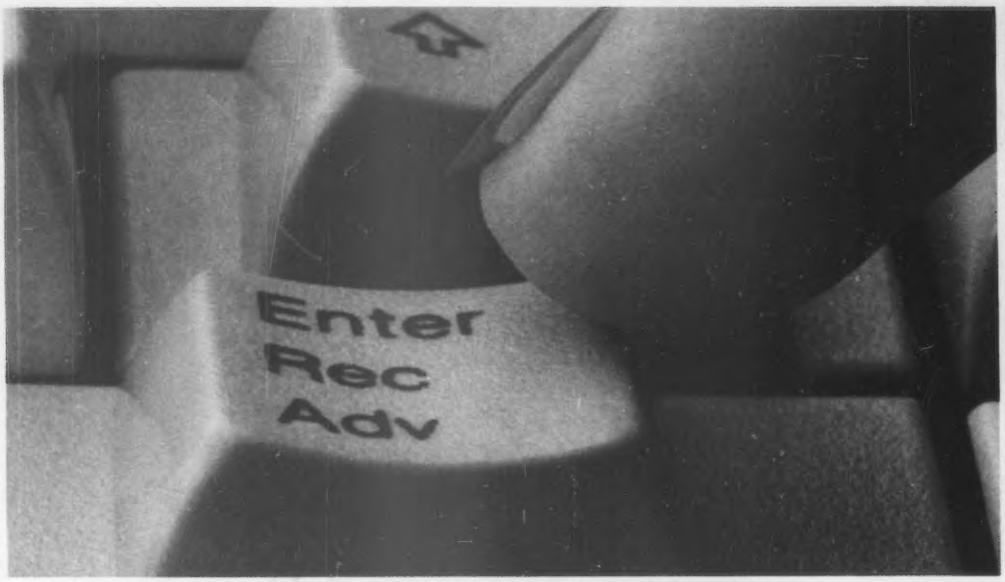
Another good direction for Dialog Manager is to replace CICS's Basic Mapping Support and IMS's Message Format Service. Such a move will certainly make application developers more productive.

ISPF's potential

Other LMF enhancements will most likely include the removal of the data set naming restriction. There will be an option of two project-level qualifiers, four group-level qualifiers and two type-level qualifiers for each data set name.

This convention allows developers to edit with their own data set names in the first data set groups and the test or production data set names in the remaining data set groups.

The possibilities for ISPF are enormous. If IBM considers the current and projected realities of the marketplace, it will ensure a continued major role for the product.



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Meet the office products IBM calls family

There's sibling rivalry, parents who don't talk to each other, orphaned children and kissing cousins. Now, the reunion. . .

By Wendy White

If IBM had it to do over again, there is doubt that its Office Systems family would ever have come to market as such a tangle of products. The term "family" is a misnomer by every stretch of the imagination. And if IBM had recognized in the late 1970s and early 1980s the magnitude of the market for office systems, perhaps it would have introduced systems that were uniquely designed to support the office — something this systems clan is not.

Perhaps IBM chose not to. Or possibly, its planners miscalculated the market. In any event, IBM has devised a strategy to overcome any shortsightedness of which it may have been guilty in the past and, in so doing, it emerged as a formidable competitor in the office systems market.

The Office Systems family strategy identifies target users within an organization and the products required to support a variety of office applications for them. Figure 1 (see page 90) shows the organizational levels that IBM designated for its strategic product offerings:

- Corporate MIS
- Department/work groups
- Professionals
- Small companies' hosts

For each organizational level, IBM identified a core group of products to support the office environment — that is the Office Systems family.

Host systems to support corporate MIS include the IBM 370 and the System/36. These hosts provide services such as library, electronic mail, data processing access tools, communication controllers and storage.

Departmental systems target departments and work groups. In small firms, they may be considered the host system. Products include the System/36 and 38, 5520, 8100 and Series/1. Vertical applications software from IBM and value-added resellers supports departmental applications.

Departmental systems provide local business processing of generic and office automation applications that act as buffer systems between workstations and the host, thereby minimizing the host processing work load.

IBM Personal Computers represent flexible end-user products that can support user-defined business processing applications. General-purpose displays enable users to access office automation applications resident at intermediate or large host processors.

IBM treads lightly

As the IBM Personal Computer becomes the corporate mainstay for the decade, IBM must walk a fine line to appease both its loyal MIS following and the sprouting population of micro users outside the MIS domain. While there is no mistaking that IBM's primary mission is to maintain its powerful control of host-level systems, it

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Wendy White is director of industry analysis for the Sierra Group in Tempe, Ariz. This article is based on her recent report, "The IBM Office Systems Strategy: Connection or Confusion?"

must do so while sustaining the momentum at the workstation level. At the same time, IBM must regain the large departmental mid-section of organizations, where it has played a very weak role.

Although the gathering of the Office Systems family into a clan brings together a variety of systems that can support office requirements, it does not necessarily represent a dedicated office automation strategy. Rather, it is a strategic piece of IBM's information systems plan that enables the company to support enterprisewide business processing.

IBM qualifies as the definitive "enterprise vendor" by virtue of its all-encompassing capabilities in the information systems market. IBM's ability to provide a vast array of information systems and products as well as extensive support through mulitple distribution channels is unsurpassed. In fact, it can be stated unequivocally that IBM has created a role model by which other vendors must be measured.

Unlike many vendors that have only a diluted presence in the organization, IBM plans to become a universal force at all levels of an enterprise. As "enterprise vendor," the company will provide multiple systems that support both generic office automation and other business applications.

MIS revisited

The key to IBM's enterprise strategy lies with MIS. As long as MIS keeps the buying power to leverage systems and products within an organization, IBM will support MIS to the hilt. Despite the influx of Personal Computers and office systems that tipped the scales in the direction of individual users and departments, MIS is beginning to recoup its power base. And having gone full circle from the centralized to the decentralized and back to the centralized environment, IBM's strategy is perfectly timed to capitalize on supporting MIS as the enterprise kingpin.

IBM will ensure strategic success by creating a dependence on the host-level system. If a wealth of information and services are maintained at that level, end users are obviously at the mercy of accessing the mainframe. Score one for MIS.

Another benefit also emerges — the value of the Personal Computer or workstation increases. Score one for IBM.

Although IBM sinks its deepest hooks into the upper echelon of the organization at the host level, it has not ignored the general (and much larger) population of users that it describes as the departmental and workstation level. This level is where IBM has been the most creative in the introduction of office products to support targeted users — even if it has to freshen up current products to do so.

For years vendors such as Digital Equipment Corp., Wang Laboratories, Inc., Data General Corp. and NBI, Inc. filled the horizontal void left by IBM at the departmental level with a variety of departmental, cluster and standalone office systems.

Now IBM is bracing to capture the large midsection of an enterprise organization that usually consists of numerous departmental layers. It has corralled a variety of its existing systems and products to ensure a top-down and bottom-up strategy that will daunt all but the heartiest competitors.

The term 'family' is a misnomer by every stretch of the imagination.

Aging hosts

Even IBM would agree that it has an aging base of mainframe systems. The 370 series, for example, is in such wide use that many organizations are not ready to make the transition to newer host systems such as the 3090 series. Therefore, the 370 is expected to remain at the strategic helm of IBM's Office Systems family to support departmental and workstation systems.

The 370 series represents large-scale, host-based office systems that extend office support to virtually all users of IBM systems and workstations. Its major role is to allow general-purpose displays to participate fully in office networks.

The members of the Office Systems family using the 370 series can be supported by IBM's major host operating systems: MVS and DOS/VSE. In these operating environments, the primary office systems products are Distributed Office Support System (DISOSS)/370 and the recently announced Personal Services/370.

The new DISOSS/370 version allows the interchange of documents with IBM Personal Computers running the IBM Personal Services/PC program. DISOSS/370 also offers continued support for IBM 3270 terminals via Personal Services/370.

Support for the IBM Displaywriter, DISOSS/8100/Distributed Office Support Facility (DOSF), Scanmaster I and the 5520 Administrative System will continue under the functions provided by previous DISOSS/370 versions. DISOSS/370 Version 3 Release 3 is designed to operate under the MVS/370, VSE and CICS/VS operating systems.

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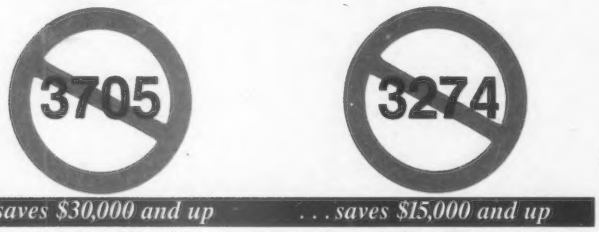

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■ Revisable-form text DCA documents, which can also be distributed from PROFS to PROFS via the DISOSS SNADS implementation.

Personal Services

Personal Services/370, a host-based application, will extend DISOSS/370 support to general-purpose displays and provide mail services (mail log, memo prompter, suspense file and distribution services for documents, messages and notes) and access to DISOSS/370 library services. According to IBM, Personal Services/370 is not intended for supporting the extensive text-editing environment, since it is more suitable for messages and office memos.

The services are intended for use by both technical and nontechnical business professionals using an IBM 3270 Information System or an IBM 3270 Personal Computer.

Personal Services/370 works in conjunction with DISOSS/370 Version 3 Release 2 and subsequent releases. In addition, Personal Services/370 extends the functions of the DISOSS/Professional Support Program offering under MVS and VSE, which will be withdrawn from marketing when Personal Services/370 becomes available.

Along with the announcement of Personal Services/370 in the MVS/CICS and VSE/CICS operating environments, IBM also plans to provide similar functionality in the TSO environment.

In addition, IBM plans to provide Displaywrite/370, a DCA text editor that will operate in conjunction with Personal Services/370 on MVS/CICS and VSE/CICS with PROFS on VM.

Horizontal and vertical

By developing an infrastructure based on supporting the requirements of a whole enterprise, IBM effectively created a cohesive framework that implies connectivity and compatibility — an "integrated" systems environment. Thus, IBM created both a horizontal and vertical strategy. While this may resemble its traditional top-down strategy, the subtle difference is that IBM has strengthened its overall position. It fortified those areas in which it has been notoriously weak — specifically, the office departmental/work group layer.

The System/36 will be IBM's salvo. Although positioned at the host level, it is also IBM's newest distributed system, which firmly establishes it as a primary departmental system. Based on this, the older departmental systems, such as the 8100, 5520, Series/1 and System/34, are expected to fade away in the near future. In fact, IBM recently announced that the System/34 will be discontinued in the European market — an indication that the transition has already begun.

And having gone full circle from the centralized to the decentralized and back to the centralized environment, IBM's strategy is perfectly timed to capitalize on MIS as the enterprise kingpin.

Within IBM's Office Systems family, the System/36 and 38 represent more economical host support for smaller organizations where a mainframe such as the IBM 370 is not required. It is IBM's intent to provide these smaller host systems with the same level of functionality that is available on the 370.

To meet this objective, IBM augmented the System/36's data processing functions with integrated office systems capabilities via the announcements of the following four office support products: Displaywrite/36, Personal Service/36, Query/36 and PC Support/36.

Displaywrite/36 offers basic text capabilities to general-purpose displays that are attached to the System/36. It allows editable interchange between Personal Computers using the Displaywrite Software Series or with the Displaywriter. Personal Services/36 is required to send a document.

Announcement highlights include the following:

■ A DCA text editor similar to the Displaywriter, with local document library services for general-purpose displays.

■ Revisable-form and final-form DCA.

■ Access to the Displaywrite/36 function for remote users via the text entry assist feature on the IBM 5294 remote control unit.

■ Integration with Query/36 for data and text merge applications and

IBM SYSTEM 38

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Personal Services/36 supports mail handling, distribution and calendar functions on both types of workstations (Personal Computers and general-purpose displays). Electronic document distribution is supported by Document Interchange Architecture and SNADS. Personal Services/36 requires Displaywrite/36 program and Query/36.

■ Distribution services include directory services, group functions, logging hard-copy mail, local system messages, enrollment and administration for users of general-purpose displays.

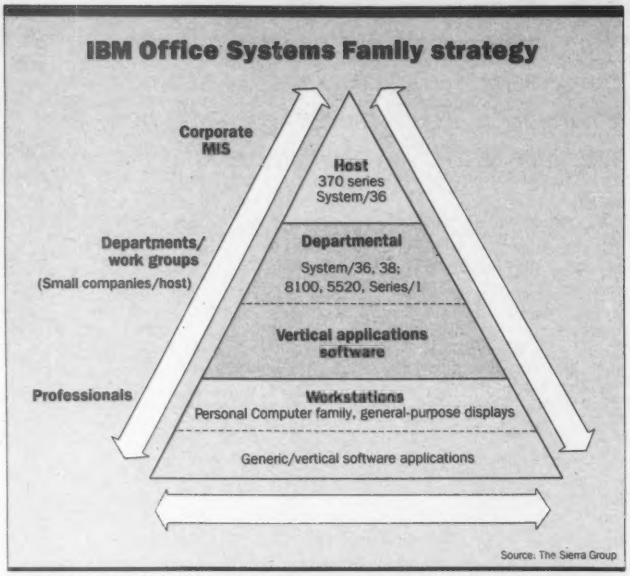
■ SNADS provides peer-to-peer document distribution to another System/36, IBM 5520 or DISOSS. DIA support with the Displaywriter provides document distribution.

■ Documents can be interchanged through DISOSS/370 with the following products: System/36 (Personal Services/36), Displaywriter, Personal Computer (Personal Services/PC), 5520 Administrative System and 8100/DOSF.

Query/36 is a query program designed for accessing information in System/36 files. It provides text and data merging in conjunction with Displaywrite/36 and can create data processing reports.

PC Support/36 consists of two sets of programs. One set runs on the System/36; the other is transferred to a Personal Computer diskette or fixed disk. It provides the ability to transfer files between the System/36 and the Personal Computer. In addition, resource sharing such as virtual disk (5M to 32M byte) and printer support is available, allowing the Personal Computer user to access the storage capabilities of the System/36.

In addition to priming the System/36 for its dual role, the Personal Computer AT is also expected to become a pivotal system to support the requirements of the smaller department or work group. Since these products represent IBM's newest systems members, they obviously form the real departmental systems equation.



IBM's enterprise vendor strategy covers the whole user organization.

The glue that sticks

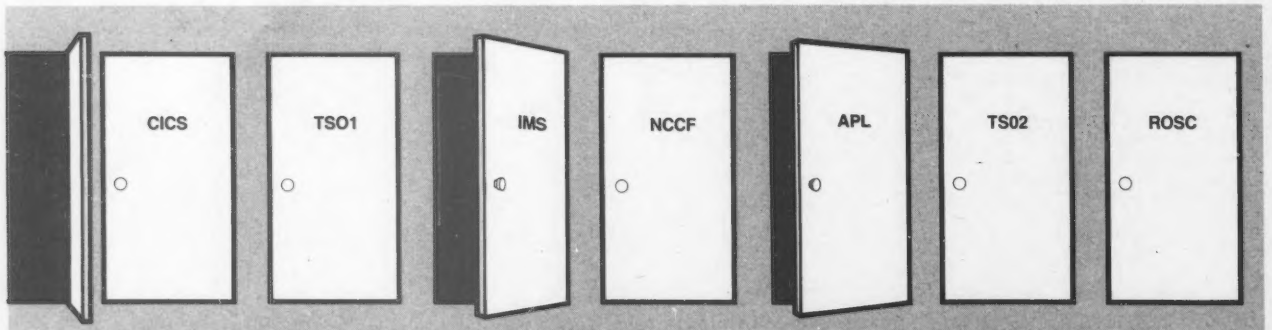
The Personal Computer, of course, has already met with unparalleled success as the workstation of choice for a vast majority of individual corporate users. As such, it will continue to be IBM's primary solution for workstations.

As the applications glue begins to set more firmly between Personal Computers, departmental and host-level systems, control of the Personal Computer population is also expected to drift upward to the MIS organization.

This dual-pronged strategy will accomplish two objectives. First, it will satisfy MIS' requirement to maintain control over systems and workstations throughout the organization because individual end users must depend on the host system to support the information and services available via the mainframe.

In addition, IBM is assured of complete enterprise penetration with systems and products that are integrated — however loosely — to share information that is generated at all user levels.

In the final analysis, the more deeply entrenched users become, the more inviolable IBM will become



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within its accounts. After all, the whole idea behind applying glue is to make sure it sticks.

As the cost of hardware decreases, the real thrust into the office systems market will be via software — specifically, software that supports industry-specific applications. By carving out yet another market niche, IBM is not only assured of capturing a sizable revenue generator, but, more important, it can orchestrate its total enterprise strategy as the consummate supplier.

System/38's role includes support of DIA and DCA as well as SNADS for information distribution peer-to-peer with other System/38 hosts and to DISOSS/370 environments. IBM also states that office workstation support on the System/38 will be directed toward intelligent workstations.

There is, however, a dearth of business applications to support these older systems. Among its newer systems, such as the System/36 and Personal Computer family, IBM has deferred to third-party software suppliers. Although IBM has addressed this void by putting in place an enormous software development effort expected to span the next decade, it does not have the competitive advantage that it may be perceived to have for the short term.

Still, the implications for IBM's competitors are clear. They must come to market quickly with products that fit into the DISOSS environment and provide DIA/DCA compatibility. While opportunities to provide workstations and cluster systems that support individual and work-group requirements will continue to exist, competitors must not only accommodate IBM's systems network but also provide value-added features and functions that offer superior price/performance.

The risks

As IBM smooths out the rough edges of its strategy, the risks should be minimal. If risks exist, they will probably come from unexpected quarters, not from loyal accounts or feisty competitors along the way. The source will be the rising confusion over architectural standards such as the U.S. Navy-supported Document Interchange Format (DIF) standard, the Consultative Committee on International Telephony and Telegraphy's (CCITT) X.400 and standards presented by the National Bureau of Standards.

A number of vendors, including Sperry Corp., have announced their support of DIF or are currently evaluating this standard as an alternative to IBM's DCA. Although DIF is not as comprehensive as X.400, the proposed CCITT standard for interconnecting messaging systems that provide a similar level of function as IBM's DIA is gaining momentum because of the market potential afforded by the U.S. government.

European vendors are also fueling the standards issue by attempting to suffuse IBM's de facto standard. This is occurring not so much because the vendors are motivated by introducing a better or improved solution but for purely economic and nationalistic reasons.

While there is certainly a risk that IBM may be challenged to defend its SNA/DCA/DIA standards, the efforts required to institute any changes will involve a long and tedious series of steps. In the meantime, there is no imminent threat to IBM's more-than-secure position in the market.

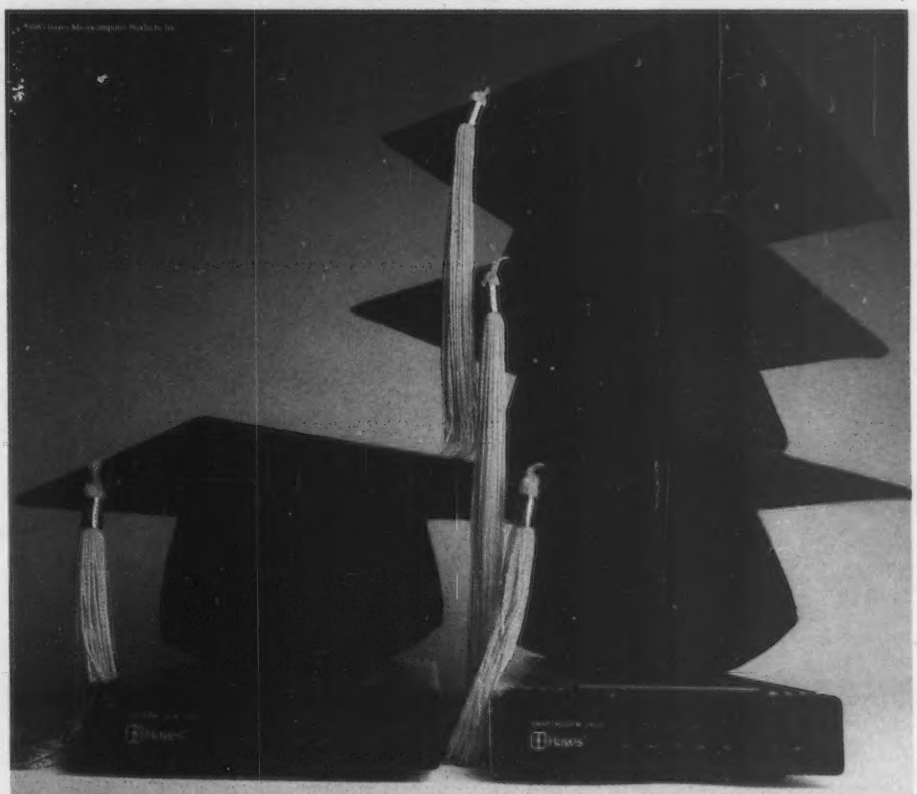
The System/36 will be IBM's salvo. Although positioned at the host level, it is also IBM's newest distributed system, which firmly establishes it as a primary departmental system.

Connection or confusion?

There is no doubt that IBM has parlayed its assortment of systems and products into more substantial office solutions than originally intended. By rechartering these systems, it has amassed an impressive contingent in its Office Systems family. And because IBM has dubbed these product groupings as members of a family, the implication is that these systems are, of course, connected and linked together by common family ties, when in fact they are less than second cousins with very dissimilar ancestry.

Although IBM's attempt to create a semblance of connectivity is not without merit, it is also highly confusing to users. After wading through sheaves of documentation to arrive at a general understanding of where and how the systems fit, even a well-versed IBM watcher can be intimidated.

Perhaps the only clear indication of what IBM has accomplished can be expressed thus: The company has recreated genetic connections via a series of applications that have been superimposed on existing systems to support office applications requirements. Whether these mutations can function together against the demanding backdrop of today's offices has yet to be determined.



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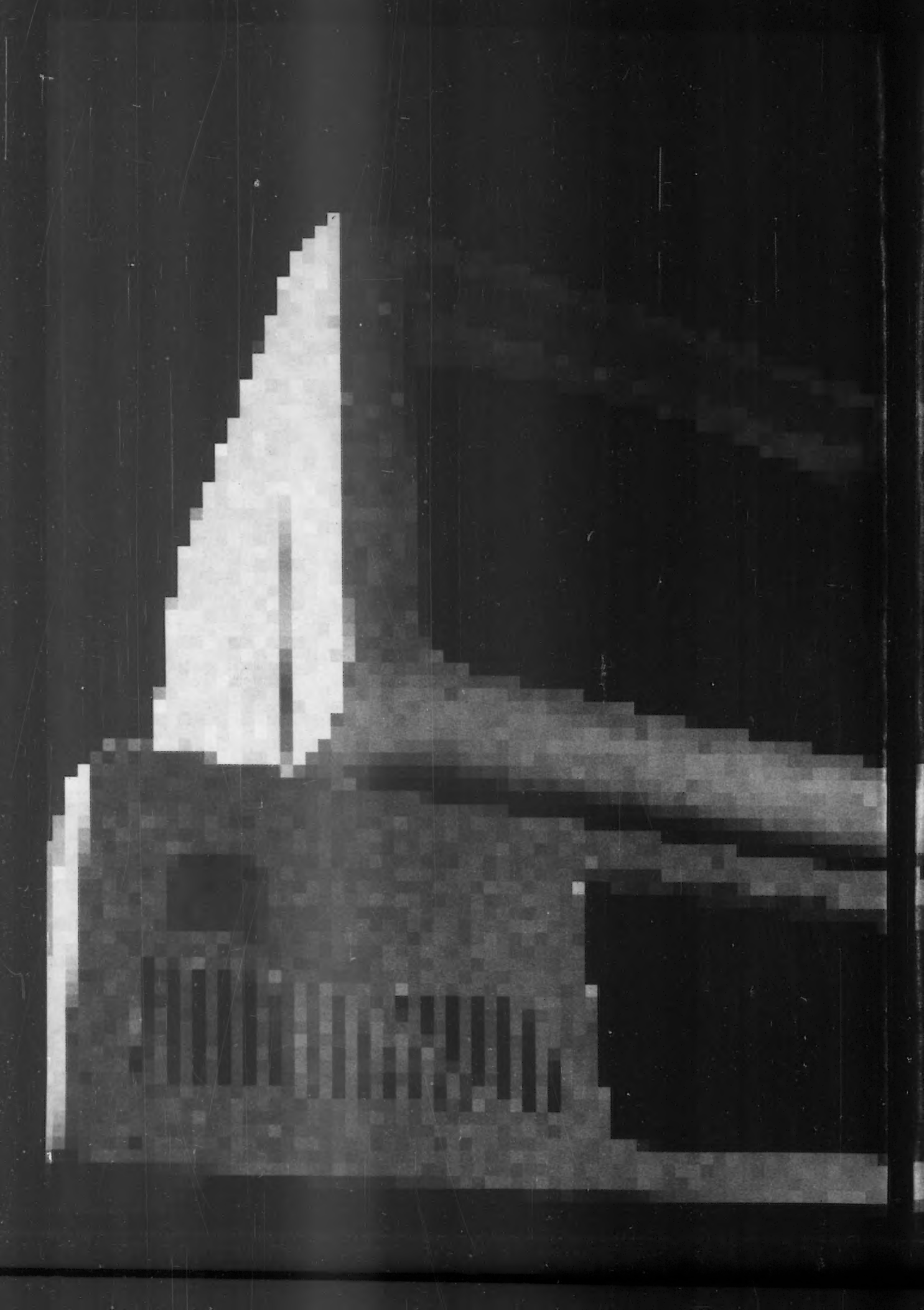

Sharper PC2 coming soon

By George Colony

IBM is in a bind. The Personal Computer is now more than four years old, and it is beginning to look downright shabby. Not only has it been surpassed in features by machines

like the Compaq Computer Corp. Deskpro, but its limited memory and speed have begun to stifle communications and software innovation.

Pricing on the Personal Computer and Personal Computer XT has been slashed, reducing IBM's margins and squeezing profits of retail stores and other indirect channels of distribution.

IBM must announce a replacement for the Personal Computer and the Personal Computer XT within the next four months or risk losing its momentum as the premier microcomputer vendor.

The raw truth is that to maintain its lead, IBM must "eat its own children" — make the Personal Computer obsolete by moving to a new generation. To do so, IBM will base its new set of Personal Computers on the much-heralded PC2, an Intel Corp. 80286-based machine that resembles a scaled-down Personal Computer AT.

IBM will move its Personal Computers through three generations. They consist of Generation One (Gen1) — the industry-standard IBM Personal Computer based on the Intel 8088 processor; Generation Two (Gen2) — the IBM PC2 — represented by the Personal Computer AT as the first member of this family; and Generation Three (Gen3) — Intel 80386-based Personal Computers.

In addition to these generations (which are all closely related to the original Personal Computer design), Forrester Research, Inc. has identified the "black sheep": a set of IBM machines incompatible with the Personal Computer but related in design and target market. These include the Series/1-PC, the PC-36, a very small 370 machine (the 4311) and a reduced instruction set computer (RISC) for scientific and engineering environments that is sometimes referred to as the Personal Computer RT (for RISC technology).

George Colony is president of Forrester Research, Inc., a Cambridge, Mass.-based research and data base firm.

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EXTRA

A major problem with IBM's generation strategy is compatibility. Gen2 will retain compatibility with Gen1 machines by using optional 360K-byte floppy drives and by operating in the 80286 "nonprotected mode" — 8088 emulation mode. Gen2 machines will distinguish themselves based on their ability to run in the 80286 "protected mode," which carries direct addressing of up to 16M bytes of physical memory and virtual memory of up to 1G byte.

With the introduction of PC-DOS 5.0 (which will support protected-mode operation), the full utility of the 286 will be available to software designers. The 8088 at the heart of the Personal Computer and Personal Computer XT will continue to run a limited amount of the software created for the protected mode.

In addition, a new class of Personal Computer software will be written to run in native 286 mode — it will possess data compatibility but limited applications compatibility with the Gen1 software. Hence, new applications will run on Gen2 machines and will transfer files to but not be loadable on Gen1 machines.

Intel is expected to lend a hand by creating much closer compatibility between the 80286 processor and the 80386 processor — the heart of IBM's Gen3 machines. This translates into better compatibility between generations two and three than one and two.

Personal Computer generations linked with market generations

Market	Generation One	Generation Two	Generation Three
Life Span	1981-1985	1985-1989	1988-
Personal Computer	Personal Computer family	PC2/AT family	PC3/VAT* family
Software	1-2-3 (Lotus Development Corp.); Multimate, Dbase II (Ashton-Tate)	Third-generation spreadsheet; networkable software; site licensed; portable licensed	Expert systems/ artificial intelligence; video-integrated software
Network	3270 protocol; modem (Hayes Microcomputer Products, Inc.); communications board (IRMA); Ethernet (3Com Corp.)	PC Network; Cabling System; Manufacturing Automation Protocol (GM Corp.); Technical Office Protocol (Boeing Computer Services Co.)	Cabling System
Integration	None	System/36, 38; 36/Attach; Displaywrite/36; DISOSS; LU6.2	370; VM; Bridge Business
Environment Software	None	Topview, MS Windows (Microsoft Corp.)	"VM Windows"

All products are IBM unless otherwise noted.
*Very Advanced Technology

Source: Forester Research, Inc.

Each generation will have associated software, networking and integration.

Pricing trends

The pricing of average Gen1 machines fell by more than half during a five-year period beginning in 1981, dropping at approximately 12% per year.

The final fire sales on the Personal Computer and Personal Computer XT will price the former between $1,300 and $1,500 (with display, two diskette drives and 256K-byte memory) and the latter from approximately $2,300 to $2,500. Expect this pricing by first-quarter 1986.

Generation Two pricing will fall at an even faster year-to-year rate in anticipation of Generation Three, scheduled for 1988. The price cutting should run between 15% and 17% per year for the PC2 family.

Deepest price declines will be found on the PC2 and PC2/XT. IBM will maintain Personal Computer AT pricing at high levels, since that machine continues to rest at the high end of Generation Two. Finally, prices for "black sheep" machines, such as the Series/1 Personal Computer and the 36-Personal Computer, will decline at between 5% to 10% per year.

IBM will retain its open policy toward the development of Personal Computer products through its Gen2 and Gen3 machines. As an IBM source stated, "... while corporate IBM is going to take greater control of the Personal Computer, we are committed to open architecture for the forseeable future — it is the fuel that has fired our success." IBM's policy toward developers contrasts with the limited prospects of Apple Computer, Inc.'s closed Macintosh.

IBM's primary proprietary direction lies in combining the open Personal Computer with other architectures — the 36-PC and Series/1-PC.

Market impact of Gen2

Each micro generation will include associated software, networking and specific integration hooks tying into other IBM machines. A new class of software should emerge for each generation of machine, and a new group of software vendors could be first to take advantage of these opportunities.

Standbys such as Lotus Development Corp., Ashton-Tate and Micropro International Corp. will be preoccupied with preserving the status quo and may fail to pursue these new avenues.

The primary market impact of Generation Two will be the following:

The legitimization of local-area networking. IBM will aggressively tie the Gen2 machines with the PC Network, its token-ring network, the Distributed Office Support System (DISOSS) and the LU6.2 Systems Network Architecture designation.

Gen1 machines will become practically obsolete. There will be a lag of between nine and 12 months before Gen2-compatible resources such as applications software and PC-DOS 4.0 become available, and the lag will preserve Gen1 viability in the short run. But the long run will see Gen1 machines excluded from new networks and applications.

Competitors such as Digital Equipment Corp., Data General Corp. and Hewlett-Packard Co. will be forced to offer Gen2 clones quickly. Their best strategy would be dual-mode machines, capable of selecting between the Generation Two operations and the "DEC proprietary" or "HP proprietary" mode. Yet no strategy will completely save these vendors if the market moves en masse to Generation Two; IBM will hold a formidable advantage over its competition.

Crucial timing

Meanwhile, IBM still is sitting on an inventory of approximately 150,000 Personal Computers and 275,000 Personal Computer XTs. The fire-sale pricing on the Gen1 machines may begin in January, with price cuts of between 15% and 25% and special incentives given to retailers who move the machines.

The announcement of the PC2 should follow the start of these price cuts by 30 to 60 days. IBM will write off a large number of its Personal Computers to make room for Gen2 — its margins and price/performance advantage depends on this transition.

Delays in releasing PC-DOS 4.0 and problems with the 80286 processor's protected-mode operation could throw IBM's generation timing off drastically. If the company announces PC2 in the first quarter of 1986, but PC-DOS and the 80286 fixes are not available until the first or second

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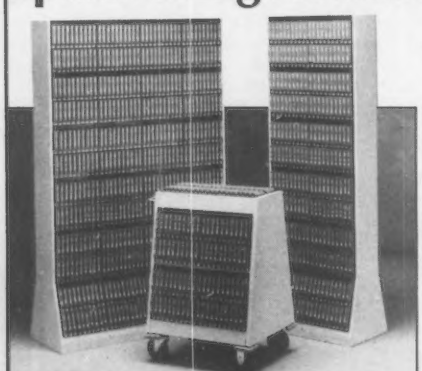

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quarter of 1986, then software will likely not become available for Generation Two until fourth-quarter 1986 or first-quarter 1987 at the earliest. Since software is the real driving force behind Generation Two, late development means that Generation Two will spend little more than a year in the limelight (the 12 months of 1987) before Generation Three is announced.

Timing will govern the impact of PC2 and its Generation Two relatives. PC-DOS 4.0 is critical to Generation Two's success — it is the linchpin to real protected mode/multitasking applications for PC2. The advent of these applications will give IBM leverage for reselling a whole new fleet of small computers to the Fortune 1,000. In this sense, IBM's entire micro strategy is being held hostage by a third party — Microsoft Corp.

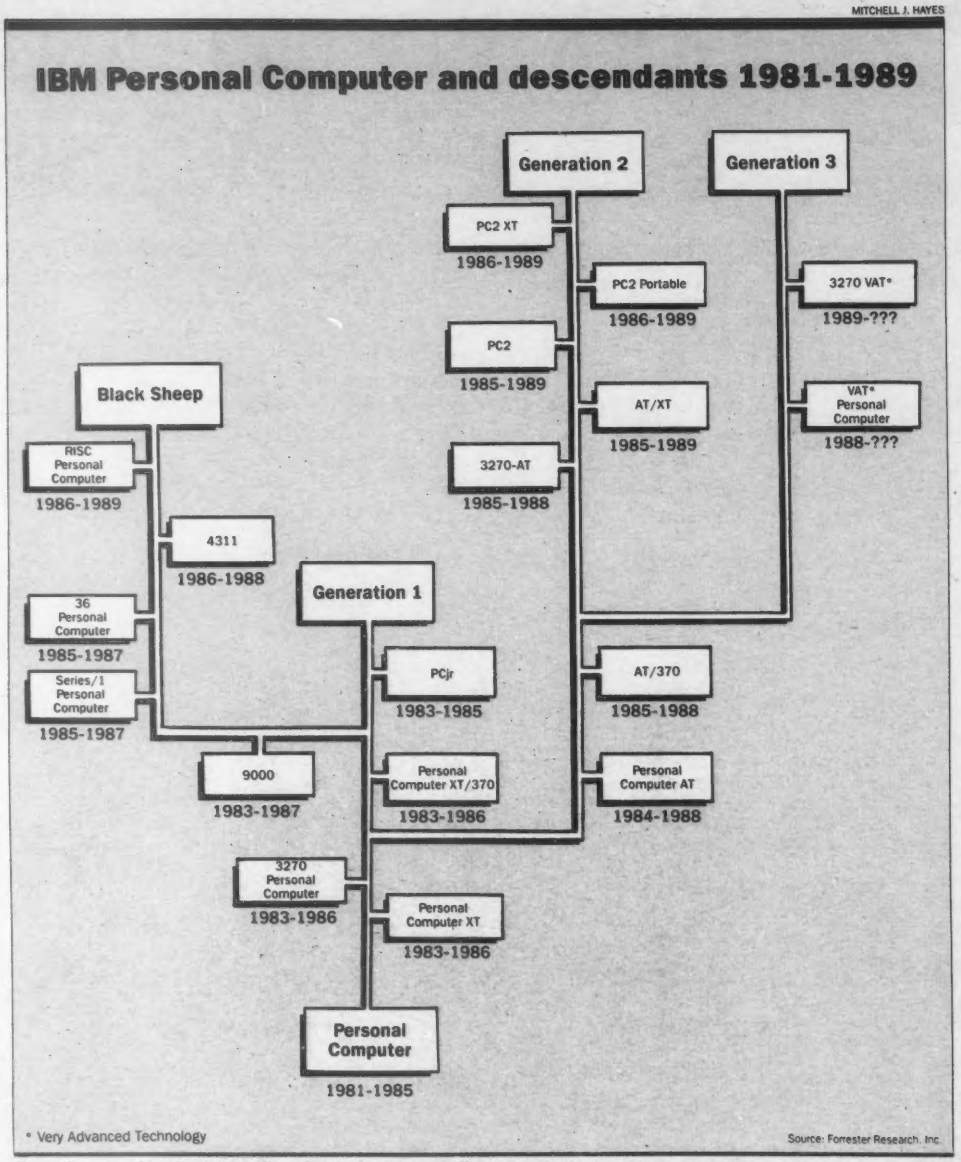
The upshot of this scenario suggests that Generation Two could become little more than a stopgap to Generation Three. Smart users and software developers may forgo PC2 and stick with the Personal Computer and Personal Computer XT for another three years before migrating directly to the Generation Three machines.

Still another new class of microcomputers looms large on the horizon — the "3M" machines. These workstations wield 1M byte of main memory, 1 million pixels of screen resolution and 1 million instructions per second processing speed. The proposed Carnegie-Mellon University "University Workstation," the Xerox Corp. 6085 and Steve Jobs' nonApple "Big Mac" all fall into this group.

These systems could simply outclass the PC-DOS, Intel-based machines IBM relies on. "3M" workstations will be able to run as full LISP processors, operate in multitasking mode and perform tasks at unprecedented speeds. Real commercial artificial intelligence packages under development may serve as catalysts.

The micro market during the 1980s has been lulled into a false sense of stability by IBM — as if one standard could be established forever. Yet the potential threat to the Personal Computer and its satellites (such as Lotus, Digital Communications Associates, Inc. and Microsoft) is already in view on the horizon.

MITCHELL J. HAYES



Over the next decade, IBM will maintain its "open policy toward the development of Personal Computer products through its Gen2 and Gen3 machines."

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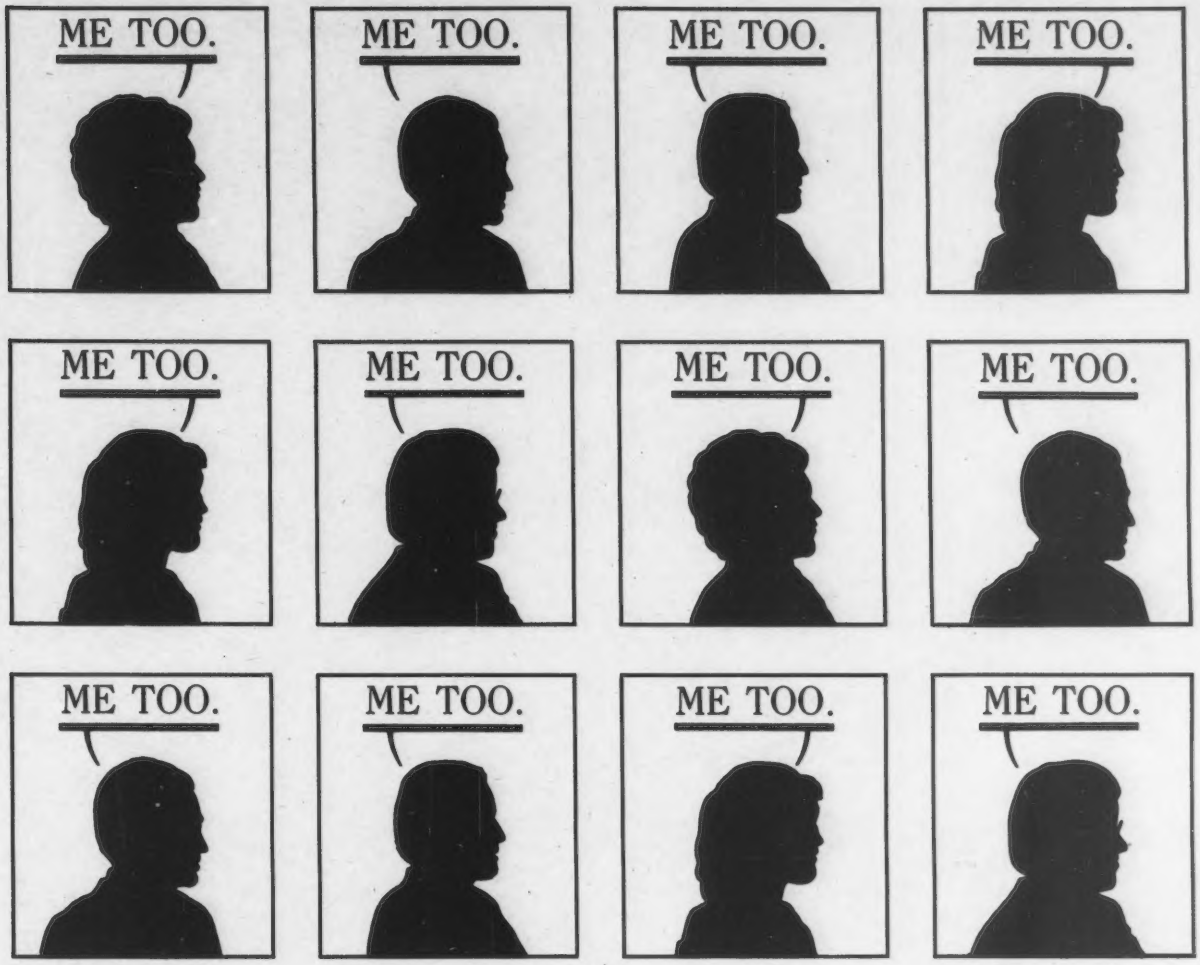

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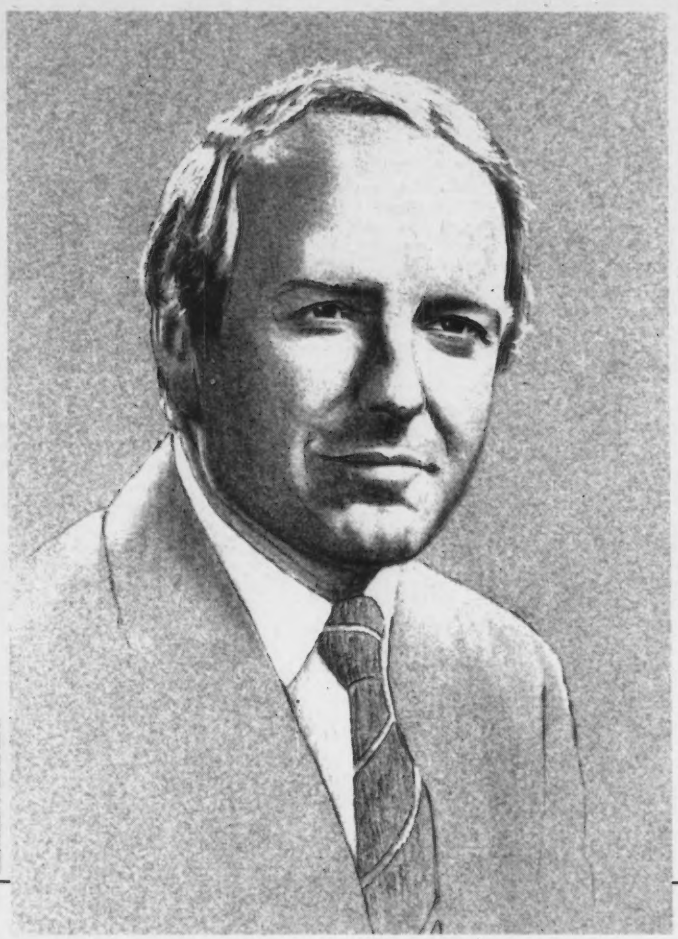


ILLUSTRATION BY BRUCE GILFOY

Interview: Robert Murphy

The token ring is out – barely

"We needed to get the token ring announcement out, and insofar as we had enough content for an initial announcement, we proceeded with it."

The token-ring network announcement of Oct. 15 set no timetable for connecting Personal Computers to departmental hosts, yet isn't that the crucial link in the office at large organizations?

Yes, the token ring is an important link to other systems, and we did say that the announcements of the token ring were our initial ones.

If you go back to the original statement on May 8, 1984, we . . . stated our intent to implement a token-ring local-area network to link different types of computers, workstations and devices within a building and to share resources and exchange information between them. The intended use for that was the attachment of IBM and OEM information workstations, distributed systems and computers.

Then it could conceivably be another year before that connection is made?

I wouldn't speculate on the timeframe. We would like to do it when it makes business sense for IBM.

What is causing the delay, then — is it a business reason or a technological one?

Those are reasons I would not speculate on in the press. It certainly is our intent to get that link done quickly. We recognize it's an important requirement.

It's very obvious from all the questions we've had about it that something is missing. But we needed to

Robert Murphy is IBM's division director for general and office systems product line planning, National Accounts Division, based in White Plains, N.Y. He was interviewed by Extra *Editor George Harrar.*

get the token-ring announcement out, and insofar as we had enough content for an initial announcement, we proceeded with it.

Do you feel pressure from your large users to speed up delivery of the token ring for connecting Personal Computers to departmental hosts or mainframes?

No, there has not been a great uproar. There's more press concern than customer concern about the connectivity. Customers tend to be proceeding with the implementation of their current strategies. What I mean is that the token ring doesn't necessarily cause a major change to the office systems strategy.

It really is a watershed kind of announcement for wiring strategies. It allows customers to see more clarity in a wiring strategy, but I think they've already selected the office strategy for implementing it.

What would be the clear choice of wiring strategy for a large customer?

Customers who have already installed the IBM Cabling System in many cases went through a decision that involved either new construction or major renovation — they're interested in wiring up the entire facility.

The primary use of the PC Network, on the other hand, has been in small clusters, which is where we market it, although it has the technical capability in some environments to go beyond small clusters.

The obvious exception is where customers have video requirements — for example, on a plant floor. The other popular environment has been the university. Where the application doesn't have a video requirement, generally the Cabling System is the recommended medium.

Users complain that IBM products don't talk to each other very well. Aren't Digital Equipment Corp. and other vendors ahead of IBM in forging links to IBM's own products?

Interconnect is certainly a key. I believe IBM holds and will hold the leadership position for interconnecting products of many types — links between the Personal Computer and departmental systems and interconnection of both of those to host-based products.

We believe the way the System/36, for example, provides connection between Personal Computers and then interconnection with [the Distributed Office Support System (DISOSS)] represents the top of the field in personal services offerings, in the vertical integration of functions and in providing easy-to-use professional aids and tools to end users.

You don't believe you've been playing catch-up with other vendors?

I think we've been setting the pace. I believe we were one of the first ones to recognize the need for connections.

We're all racing to provide better interconnectivity for customers. I don't think anyone is sitting back on his laurels saying, "I'm there. I've got everything I need." Each vendor is trying to provide functionality, ease of use and consistent implementations across a spectrum of hosts, distributed systems and intelligent workstations. That has not been simple technically for any of us.

When we at IBM talk of these interconnect strategies and the office systems strategy, we talk in terms of four models. The first is the DISOSS model — implementing the host function with both intelligent workstations and fixed-function workstations attached. IBM's products in this category, DISOSS Personal Services and Personal Services/PC, do a fine job of connecting both fixed-function displays and intelligent displays directly into a host. They also provide professional tools and aids.

The second model is [the Professional Office System (PROFS)]. In the VM environment, PROFS provides very tight integration of intelligent workstations and fixed-function displays. With the introduction of Displaywrite/370, both types of workstations have a consistent text editor.

The third model is the System/36, which really is the creme de la creme of the interconnect because of its simplistic implementation of vertically integrated office functions.

The fourth model is either the PC Network or, after the recent announcements, the token-ring network, both of which provide connectivity through gateways into other systems.

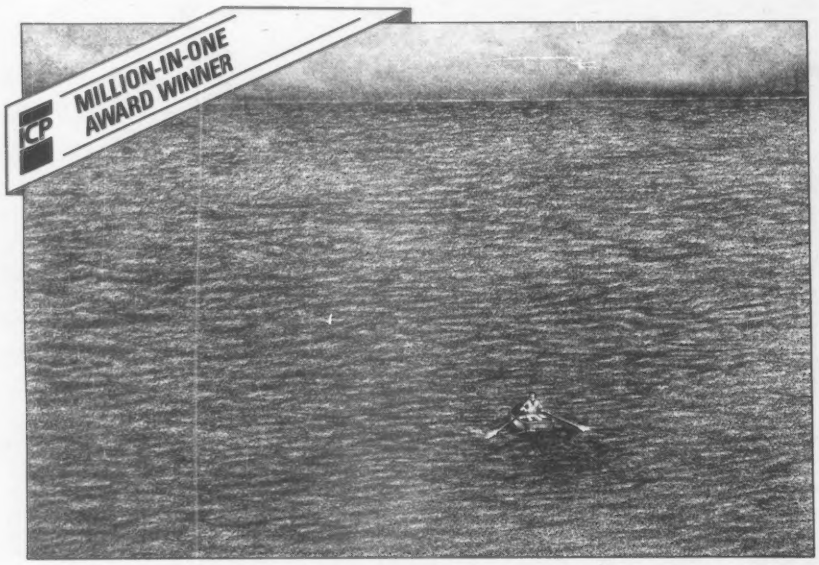
Would you say that Displaywrite is easy to use right now?

Well, I would say that Displaywrite 3 on the Personal Computer in the secretarial environment is viewed as the best text product in the market. Some would debate that, but it's true functionally and from an ease-of-use point of view.

I would prefer — and our customers have told us they would also like to see — a Displaywrite that has a little less function and is easier to use for the professional.

Is IBM encouraging a two- or three-tiered approach to office systems?

With respect to the four models I mentioned, yes, there is a three-tiered strategy, but we don't think all customers will implement it. For example, I know of one large aircraft manufacturer that for security requirements doesn't want to use any intelligent workstations. That company will use a large host, probably a VM-based PROFS environment, with fixed-function displays to meet its security



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requirements. Other large companies will install token-ring networks attached to 370s via gateways or communicating with other distributed systems such as the Series/1.

To what extent did the October announcement of PROFS Version 2, Release 1 complete the integration of office software?

I think it was a giant step forward in integrating a host-based offering. Now there's a final-form bridge between DISOSS and PROFS, with the ability to pass notes back and forth and to make usability enhancements. There's also a new calendar.

Our customers were a little bit frustrated about how PROFS is going to play into DISOSS. We've eliminated that frustration because PROFS users can now pass a message into a DISOSS system. Revisable-form documents can also be interchanged between them.

What remains to be done to complete the PROFS-DISOSS connection?

From a connectivity point of view, we're almost there. We'd like to see more consistency between the two products — use of the same calendars, for example.

From a usability point of view, we'd like to get [the two environments] to look as much alike as they possibly can.

What is IBM's commitment to the 8100 line?

We have significantly enhanced the 8100 over the past 18 months. We've announced several new processes and new DASD. Today, it actually has more function than the System/36. As we've made DISOSS enhancements, we've maintained currency between the DOSF line and DISOSS enhancements. IBM is very sensitive to protecting the investment that customers have made in the 8100.

But you have not made the 8100 central to your office strategy.

That's correct. We have not made it the lead system, and a lot of that has to do with our ability to be competitive with the large number of office applications that are out there — the DEC and Wang Laboratories, Inc. offerings. The System/36 provides us with the kind of price competitiveness that we think will serve us well in this market.

What is IBM's commitment to the Series/1?

We made a statement of intent in March 1984 that we intend to support Document Content Architecture and Document Interchange Architecture and SNA Distribution Services on the Series/1. While we haven't executed that intent statement yet, it is certainly our desire to bring to the Series/1 features comparable to what you see on the System/38.

What is IBM's commitment to the 3270 Personal Computer?

Its role in the office is a high-function Personal Computer. It will be a primary player where sophisticated 3270 emulation is the requirement. If you were to rate variations of 3270 emulation, 3270 Personal Computer is the high end.

What are your large users worried about in your office strategy? What are they pressuring you for?

They want immediate solutions for their departmental system productivity/office programs. And the announcements of the token ring really brought us to new levels of interconnect capabilities for these programs.

The world of ASCII is now able to play into the world of the IBM office. The announcements brought some logic to cabling structures that customers have been struggling with over the last several years in terms of how to wire their buildings.

I think the key word in the announcement was "openness." We'll start to see more different kinds of devices interconnecting in the systems network.

But the office strategy remains the same. We are attempting to structure the strategy into the four model work groups and to deliver functions all aimed at significant interconnectivity. Our attempt was to provide more structure and discipline to the implementation of office systems but at the same time remain flexible enough to respond to our customers' requirements.

There have been opportunities on the horizon that have been talked about for years that we've never really cracked. One is voice [applications]. Our first step into the voice area was the announcement of voice cards on the Personal Computer.

The other major area to penetrate significantly is image. The goal is to provide total integration of text, office, voice and image and to integrate the data requirements for them.

Next comes the integration of the private branch exchange and the telephone itself. The ability to integrate these functions is the key challenge still in front of us and the whole industry.

When will the "totally integrated office" come to be?

There were people five years ago who said, "Next year is the year of image." I believe it's going to be over the next five to seven years that full integration takes place.

Nobody uses the phrase "paperless society" anymore. But the things people talked about 15 years ago when they coined that phrase, we're still working on.

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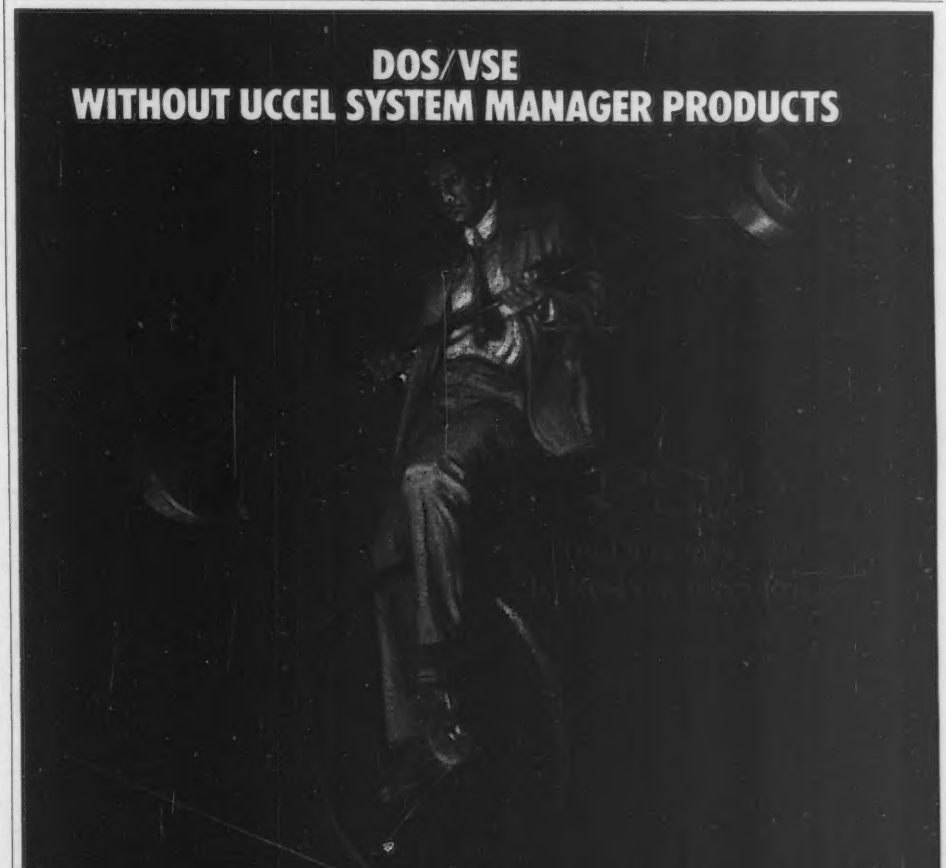

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(The following reports come from the Computerworld *News Service.)*

Cashing in on NTT Japan

By Takehisa Kondoh, Int'l Editor
CWN Tokyo Bureau

TOKYO — To hear some Japanese computer businessmen talk, September closed in this country with "IBM week." Japan's electronics circles were shaken by the Sept. 25 announcement by Nippon Telegraph and Telephone Corp. (NTT) that the Japanese company will join hands with the world's computer leader to establish a firm for enhanced data communications, a step many fear will speed IBM's market penetration here.

Top executives at Japanese computer makers, such as Fujitsu Ltd., NEC Corp. and Hitachi Ltd., took immediate, coordinated countermeasures against the two powerful concerns, prodding the Japanese Ministry of Posts and Telecommunications to delay, and possibly kill, the venture.

The new firm will be held equally by NTT and IBM Japan, Ltd., a wholly run Japanese subsidiary of IBM. An NTT announcement said that in addition to broad cooperation in data communications, the joint company will aid parent IBM in developing software for current Japanese users of IBM equipment and will support sales of smaller IBM machines in Japan.

Domestic computer and communications chieftains oppose the joint firm because they are afraid IBM may dominate the Japanese computer and office automation market. An executive from one Japanese computer vendor remarks, "With this tie-up, NTT could be a sales agent for IBM."

Traditionally, this telecommunications market is monopolized by strong Japanese manufacturers holding long-term procurement contracts with the formerly government-held NTT. Fujitsu and NEC have been two of the main contractors of communications equipment and data processing terminals for the nonmanufacturing NTT. By teaming up with NTT — Japan's biggest purchaser of terminals and telecommunications equipment — IBM aims to recover its market strength in Japan. The arrangement allows IBM to cash in on NTT's huge marketing network and 4,000 data communications systems engineers.

As a Japanese computer industry analyst describes it, IBM's approach to NTT in the past several years was "helter-skelter." The analyst adds, "Simply put, IBM has been going after the logo power of NTT as Japan's telecommunications monopoly."

There is a simple reason for IBM's drive. In 1979, IBM lost the top computer sales position here to a domestic firm, Fujitsu, and now ranks third after Fujitsu and NEC. What's worse for the U.S. giant, Fujitsu presently outsells IBM in the mainframe market, IBM's bastion.

The joint company would aid IBM in developing software for Japanese users of IBM equipment and support sales of smaller IBM machines.

According to Japanese analysts' speculation, IBM may have badly needed NTT's know-how on the efficient networking of data processing terminals in order to restore quickly lost ground in the computer market. An official with a major computer manufacturer observes that business and personal computers and word processors, if distributed in a networked system, will bring sales two times greater than the revenue from mainframe computers.

For IBM, the immediate market goal in Japan is set on the value-added network, a form of multiservice digitalized data communications. Some Japanese officials say that IBM's future in Japan hinges on how deeply the computer giant will bite into NTT as the country's largest value-added network operator.

The better part of the joint-firm deal consists of the linkup between IBM's Systems Network Architecture (SNA) and NTT's Data Communications Network Architecture (DCNA). The contract also called on the new firm ultimately to supply the Information Network, IBM's SNA-based value-added network, in Japan.

IBM apparently is targeting NTT's network, for which Japanese computer firms have supplied large numbers of terminals. Government statistics say that Japan's value-added network market will expand from $230 million in 1983 to almost $3.7 billion in 1990.

In Japan, more than 70% of computer users, mostly business firms, depend on non-IBM equipment, and all of them run individual business communications on NTT cables. These users are concerned that NTT's progressive tie-up with IBM will surely cause them to reconstruct corporate communications systems.

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IBM International

Crying foul over NTT-IBM

By Glenn Rifkin
CW Staff

TOKYO — Though IBM's joint venture with Nippon Telegraph and Telephone Corp. (NTT) will have modest goals initially, there is little doubt on either side of the Pacific that the implications of this connection are frightening to competing computer and telecommunications suppliers.

At the outset, the new (and as yet unnamed) company will produce a conversion of the IBM Systems Network Architecture-NTT Data Communications Network Architecture protocols, a project begun in December 1983.

Marrying IBM's de facto networking protocol standard in the U.S. with Japan's similar standard has staggering potential in its own right. Notes Yuji Ogino of International Data Corp. in Japan, "If they are successful, the IBM protocol will become the industry standard, and that sets up IBM to capture the largest market shares in the Japanese telecommunications and computer markets."

For the DP/MIS director in the U.S., the joint venture will have less immediate impact, but it does provide IBM with much-sought-after access to the technology and human resources that powerful NTT offers in the telecommunications game. According to Kaoru Kubo, vice-president and general manager of advanced communications systems for NTT International and chief negotiator of the NTT-IBM deal, the venture was not designed to get NTT into the U.S. market but to make it a power in such markets as China and Latin America.

Kubo acknowledges that IBM is agressively pursuing the telecommunications market in an effort to compete with AT&T.

Reaction to the announced joint venture was swift and angry in Japan. When asked who cried "foul" at the announcement, Ogino replied, "Everybody." He says such a connection would have been unthinkable several years ago, but trade frictions between the U.S. and Japan are currently so high that the Japanese government was forced to allow the deal to happen. Additional pressure from the U.S. government to get NTT to improve its import record from U.S. companies added to the successful marriage.

NTT may well form alliances with other U.S. companies. Indeed, the Japanese firm announced in September plans to exchange information and resources with AT&T. But thus far, IBM's move has been the most significant. "IBM has more political power than other companies," Ogino says.

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- Facility services
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  Establishment of on-line DP centers that can be used commonly by industry-specific users.
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- Labor unions
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- Low profile
  The start up of the joint-venture operation will be carried out with a low profile so that the firms may avoid creating any sensation in the Japanese computer industry.

* Dollar figures are U.S.; some approximate.

Source: IDC Japan

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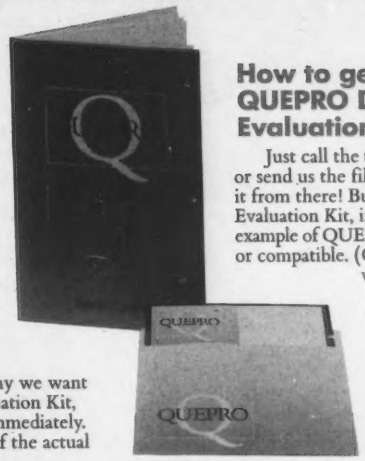

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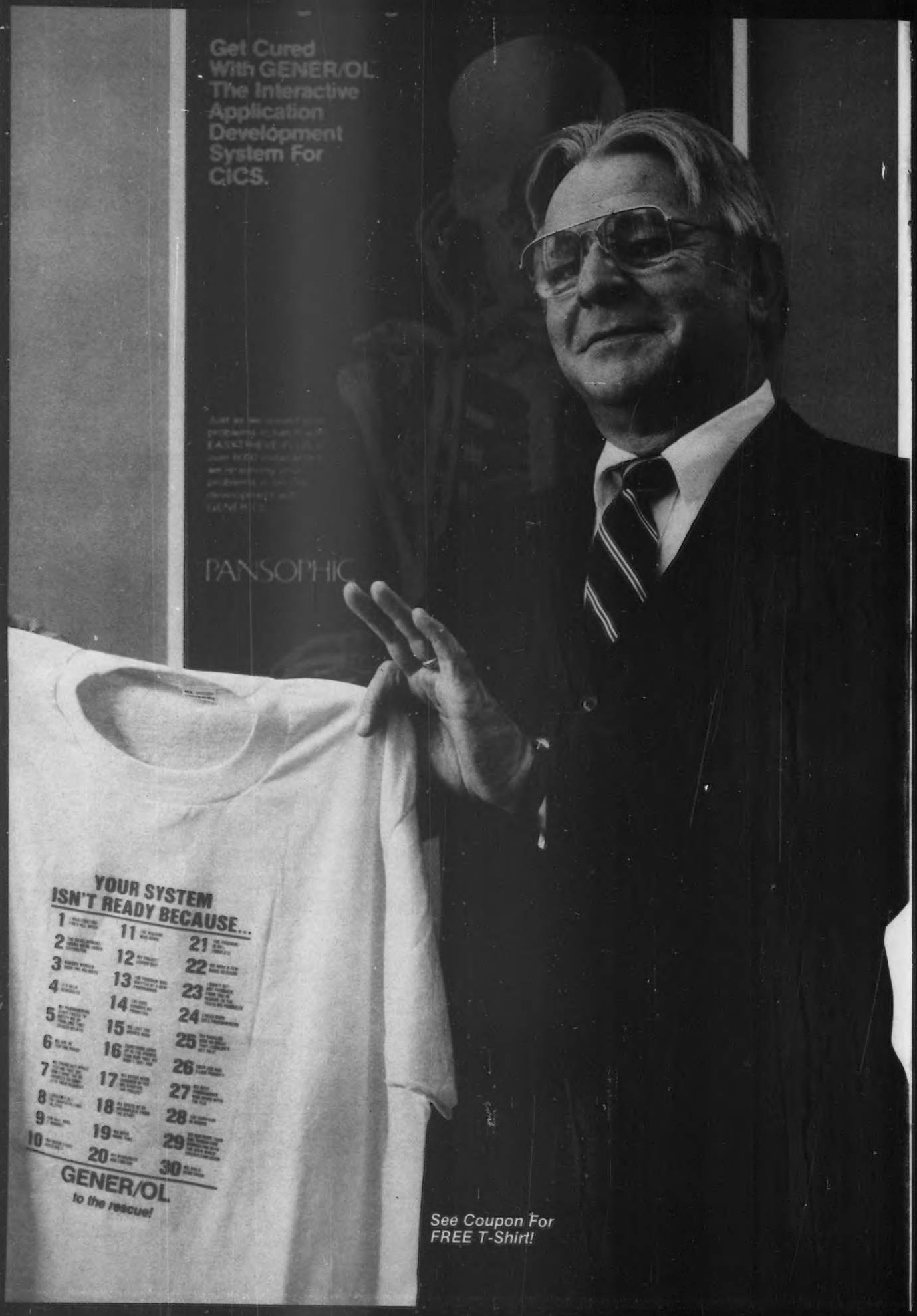
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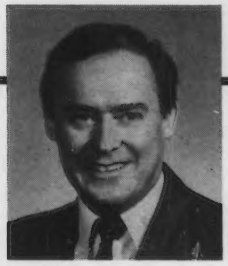

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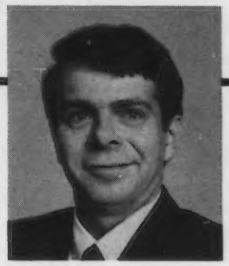
Finn Schjorring
President and Chief Executive Officer



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By Knut Ivar Skeid, Editor
Computerworld Norge

OSLO — IBM Norway is a pure trading company; no development or production takes place here.

Earlier this year, IBM Norway tried to place some major orders to Norwegian manufacturers for parts production for their typewriter plant in Sweden, but the manufacturers weren't interested. Some Norwegian companies do have smaller contracts with IBM for production of some mechanical parts in IBM products.

In Norway, unlike in other European countries, Amdahl Corp. competes successfully against IBM in the plug-compatible mainframe market. Several bigger banks and insurance companies chose Amdahl instead of IBM as their major system supplier in the last couple of years. Amdahl also delivered the first supercomputer to Norway, actually a Fujitsu Ltd. VP-1100 with an Amdahl 470 front end.

Despite the lack of manufacturing presence, IBM is Norway's largest computer company, with a turnover in 1984 close to $250 million (U.S.). The No. 2 company is Norsk Data, which is only about half as big on the domestic market.

At a press conference in October, Eyolf Haug, president of IBM Norway, presented a plan for establishing a scientific research center at the University of Bergen in the western part of Norway. No other Scandinavian university will match the computer power at this site.

IBM will give the center to the university, and over the next five to seven years, the company will invest about $40 million (U.S.) in the project. The center will rely on an IBM 3090 as its main computer. IBM will place 10 to 15 of its international research personnel at the center, which will employ 30 to 40 people altogether.

The Bergen research project marks the second time IBM Norway has donated computer systems to Norwegian universities. The Norges Tekniske Hoyskole, the leading technical university here, was given an IBM 4361 system with a link to the European Academic Research Network. The gift was valued at $750,000 (U.S.).

The research center at the University of Bergen will host research in the fields of offshore oil technology and the fish-farming industry (where world-famous Norwegian salmon spawn) as well as general research in information technology.

IBM owns six other research centers throughout Europe, in Paris; Rome; Madrid; Winchester, England; Pisa, Italy; and Heidelberg, West Germany.

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Picking off ICL customers

By Jane Lawrence, Deputy Editor
Computer News

LONDON — IBM's strategy in the UK aims mainly at picking off competitors' customers and picking up value-added network contracts.

The attack on IBM's chief competitor, British mainframe maker International Computers Ltd. (ICL), is certainly paying off. In recent months, IBM moved in on ICL contracts with the Ministry of Agriculture, retailer Woolworth & Co., Midland Bank plc and British Steel Corp., to name a few.

IBM has not taken over these accounts completely; but it achieved the foot in the door that it was looking for. Once in the door, IBM is almost impossible to dislodge, although many true blue customers are now buying a token Japanese mainframe to keep the titan on its toes. IBM acquires the new accounts via high-level contact with prospective users and by offering more computing power than ICL, which builds only small mainframes.

ICL is suffering from the onslaught. A British Telecom contract for 30 mainframes was meant to be split between the two suppliers when announced last year.

But in October, British Telecom said the remaining six sites in central London were almost certain to go to IBM. That would tip the score to 24 vs. six in IBM's favor.

IBM's other principal target for new business is value-added networking. Last year, the government turned down the proposed joint venture — Jove — between IBM and British Telecom. IBM's European president, Kaspar Cassani, said the company would continue its effort to set up a value-added network in the UK.

Setting up networks for customers could prove a lucrative business. Not only could IBM charge for management facilities and similar services, but responsibility for a network could give the company some control of its customers' buying patterns.

IBM often underscores its corporate conviction that the value-added network business has great growth potential, particularly because of the continuing convergence between computer and telecommunications technologies.

IBM International

Brazil opens up to IBM

By Vera Dantas
Editor-in-Chief, Data News

RIO DE JANEIRO — IBM has always been considered a great danger to the national computer industry in this country.

Brazil's policy has sought not only to develop a homegrown industry but also to halt the advance of IBM Brasil Ltd., which dominates the mainframe market.

But times have changed. The national industry now finds itself strong enough to permit approaching foreign companies more closely. IBM also has changed its way of acting locally.

In 1977, IBM was very aggressive and tried to impose the marketing of the System/32. However, sales were blocked by legislation.

The Informatics Law, number 7232, contains 46 articles

Today, IBM wants to be a partner with local industry in national development.

"with the objective of enabling national capacities in the activities of informatics" — in Brazilian terms, the computer industry.

Under the law, only Brazilian national computer companies could produce and sell microcomputers, minicomputers and peripherals here. The law does not permit joint ventures, so foreign companies were effectively barred from doing business here.

Today, IBM wants to be a partner with local industry in national development. This fall, IBM reviewed a program that aims to buy components made in Brazil for IBM's own use as well as for exporting.

The program, called "Partnership in the Technological Development," was launched at the fifth International Fair of Informatics, held in Sao Paulo, Sept. 23-29.

Instead of Personal Computers, IBM exhibited the Brazilian compatibles — micros, terminals and communications controllers made by IBM's partner companies. All the local manufacturers were invited to show their products at IBM's exhibit, and the first 11 to answer the invitation were selected.

The local IBM president, Robeli Libero, describes the partnership: "It will give better opportunities to the Brazilian vendors. It will reduce the cost of IBM programs and permit the increase of technological exchanging and new technologies."

A week after IBM had announced the program to the national industry this fall, the former executive secretary of the Special Secretariat for Informatics (SEI), Edison Dytz, criticized IBM for its undue influence on Brazilian industry. IBM donates computers to Brazilian universities, causing some concern among local authorities about the company's influence on academic research.

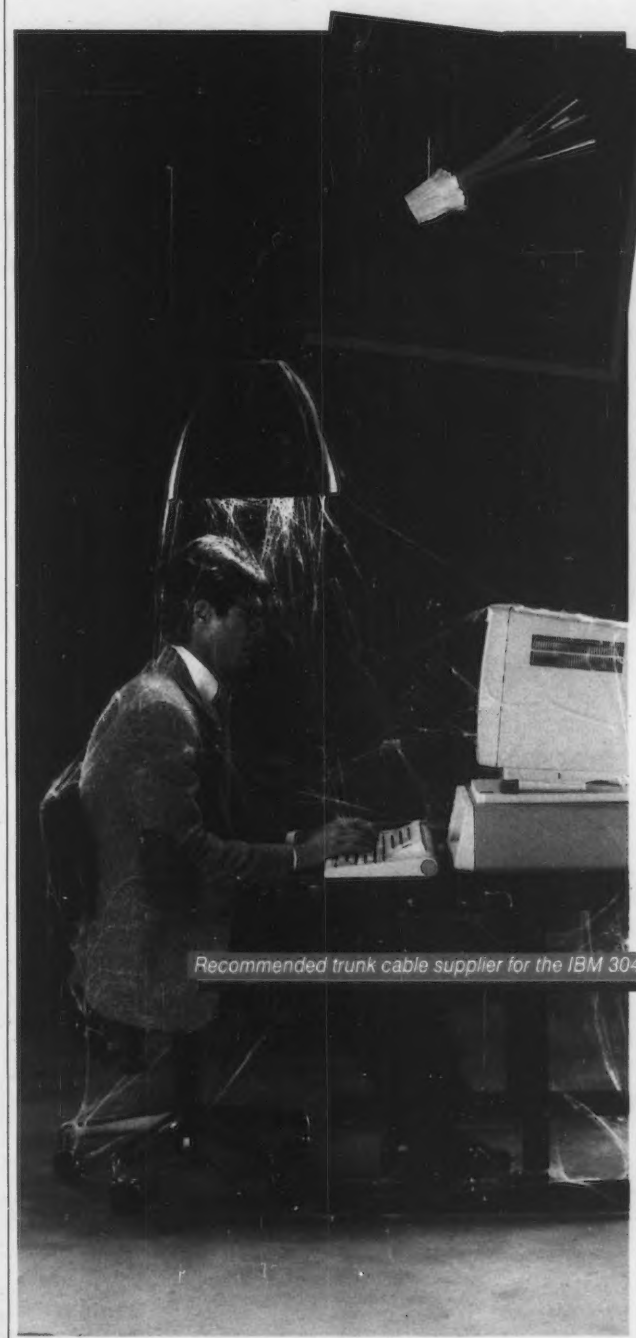
Dytz, recounting the impressions he received when he was head of SEI, says that the Brazilian vendors are selling themselves to IBM.

Doria Porto, currently SEI's executive secretary, agrees that there is a risk that the national industry could become a mere supplier of components and parts to the multinational — IBM.

According to the secretary, IBM has not yet sent to SEI its plan for purchasing equipment from Brazilian firms.

In the event that the industries involved in the project intend to import any components, IBM will have to submit its orders to SEI.

And if SEI finds that the negotiations wound the Informatics Law, it will deny importation, turning the joint project into a fiasco.



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IBM International

Staying on top down under

By Peter Scott, Editor
Computerworld Australia

SYDNEY, Australia — Isolated at the south end of the Pacific Basin, about as remote as it is possible to be from the computer manufacturers of the U.S., Australia has developed a vibrant computer-user community.

The country's users have earned a reputation for developing good software, for stretching hardware performance and for being prepared to try almost any product that promises a needed solution.

The market is dominated, as in most of the world, by IBM. But the number of other manufacturers represented is enormous. At the mainframe level, IBM faces the normal competition from the BUNCH companies and plug-compatible manufacturers plus the direct representation of the Japanese (Fujitsu Ltd.), Europeans (Nixdorf AG) and British (ICL Ltd.). All have prestigious installations and aggressive business plans. IBM is forced to work hard to retain its market share, growth and profitability here.

To overcome the aggressiveness of the opposition — particularly Fujitsu, which after several mediocre years is going all out to become a market leader — IBM has been forced to grant substantial discounts to hold onto several major accounts.

In May, the Western Australian government won a $10 million (U.S.) discount on a $36 million (U.S.) order shared by IBM and Amdahl Corp. in which IBM provided the bulk of both hardware and software.

Although IBM does not like to admit to such discounts, they are not uncommon.

Nonetheless, IBM's domination of the market is unquestionable. In 1984, its revenue reportedly reached $465 million (U.S.), and International Data Corp. Australia predicts IBM revenue will exceed $610 million (U.S.) this year.

The opposition can reach such a figure only by combining the revenues of the six or seven "next best" performers.

At the personal computer level, IBM again is the market leader, although it has experienced little luck arranging timely shipments of its products. Several times, eager potential users waited for Australian releases of Personal Computer products, their appetites whetted by reports of overseas progress. IBM Australia reported that machines were not available until the demands of the U.S. domestic market could be met or until some undisclosed problem is overcome. The PCjr was never released in Australia, and the Personal Computer AT was not formally shipped until September 1985.

On the other hand, IBM's Japanese-produced Personal Computer JX was released here in September, before users in the U.S. saw the machine. It is still too early to report on user reaction to the JX, but reports on the introduction itself say there was a single main factor in the early release: Apparently IBM was granted a preferred-supplier status for the JX by the Victoria state government.

IBM has been forced to grant substantial discounts to hold onto several major accounts.

In return for some large government orders of both mainframes and Personal Computers, IBM was forced to conform to offsets programs, which require the return of some technology or support to Australian industry.

IBM did so by establishing links with Australian software houses and building a factory in Victoria, where it assembles its major Personal Computer products for domestic sales and limited export.

The plant has been widely criticized as a "screwdriver operation" with minimal input to the Australian computer industry. While IBM denies such allegations, one International Data Corp. Australia researcher notes the company's involvement in the plant is carefully controlled. He says he believes Southeast Asian manufacturing facilities could entice IBM's assembly away from Australia if the price differential is great enough and the quality can be assured.

Nonetheless, the production of Personal Computers affects IBM's Australian operations little. In March, the government granted licences to 16 foreign banks.

With that many new banking operations to be equipped from scratch, competition among computer vendors heated up. IBM pulled out all stops and won a sufficient number of the orders to ensure good growth in its revenue for 1985-86 and beyond.

While the squabble intensifies over who really rates as Australia's second computer company, IBM, unchallenged and unconcerned, sets a pace all others find hard to match.

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IBM International

IBM has sought greater influence in research, partly through gifts of computer equipment to such well-known universities as Karlsruhe and Heidelberg.

Quiet partners in W. Germany

By Claudia Marwede-Dengg
Senior Editor, Computerwoche/RFA

MUNICH — IBM Deutschland GmbH, West Germany's market leader in computer sales, practices policies specifically aimed at helping it blend into the corporate landscape here. The strategy of IBM's German subsidiary matches the policies of Big Blue throughout Europe: signing contracts with local suppliers and cooperating with local industry, universities and research centers to avoid public criticism for being an outsider.

For example, the German electronics giant Siemens AG holds one agreement whereby it provides IBM with computer chips as well as a second agreement to distribute IBM 3380 disk drive systems. The most important contractor for IBM Deutschland might be Triumph Adler (TA), a Nuremburg-based typewriter maker. In a joint venture, TA supplies IBM with OEM equipment for the U.S. market.

For the past year, IBM has sought greater influence in universities and research centers. Such well-known universities as Karlsruhe and Heidelberg received large amounts of computer equipment as gifts. IBM is sending scientists and others to universities to support research projects.

IBM enjoys a long-standing research and development partnership with Gesellschaft fur Mathematik und Datenverarbeitung (GMD) near Bonn. The GMD was founded by the federal government as an institute for research in information and communications technologies.

In terms of government contracts, IBM won an order for the installation of the postal and telecommunications authority's national videotex network. It also landed a contract for the German Postal Services' "Audi Project," an automatic telephone information service project. Such spectacular orders are crucial to IBM's strategy for retaining market dominance.

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Dutch control complex SNA

By Hans Braggaar, Deputy Editor
Computerworld Benelux

ZOETERMEER, Netherlands — IBM's most advanced and most complex Systems Network Architecture (SNA) network is controlled from here. With special software, the 25,000 SNA users worldwide potentially may access the International Network Services (INS).

This physical network with controlling computers delivers several IBM service bureau offerings. Among them are the UK-developed Application System software, the relational Business System 12 (BS12) software system (developed in the Netherlands) and videotex and on-line data base services, all grouped under the heading of International Business Services (IBS).

"Zoetermeer is the home of IBS, an umbrella offering with direct communications lines to 13 European countries, the U.S. and Japan," says Ashley Lattimer, sales manager for IBS. The worldwide INS uses physical networks offered by the European Postal Telephone and Telegraph services and also dedicated links to Israel and South Africa. The services offered through IBS are available in another 37 countries around the world.

"The Application System software is moving toward becoming IBM's mainstream information center product as a licensed software product and as a service bureau product," Lattimer says. The software was announced for the U.S. market two years ago.

Under the direction of British developer Tony Temple, Application System has emerged into a strong fourth-generation applications development language and decision support tool, popular in Europe and elsewhere. For the past two years, the software has gained acceptance in the U.S. as a product with a Europe-only history but with a promising future.

Since the early 1970s, IBM's service bureau (Data Centre Services) was a Europe-only affair. IBM sold its U.S. service bureau to Control Data Corp. in 1970. The Netherlands became the European know-how center for international computing, providing the operational expertise for the International Business Services offering. Much of the company's software development

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for internally used networks is done at one of IBM's larger development centers in Uithoorn, Netherlands, which controls a network of 30,000 workstations.

Under the IBS umbrella, IBM offers its BS12 software system. The system uses 12 relational commands to manipulate large volumes of data, including data entry and transaction processing. At the moment, Europe is the prime market for selling the BS12 services, according to Lattimer.

BS12 is based on E. F. Codd's publication "A Relational Model of Data for Large Shared Databanks" (1970) and was developed in Uithoorn in a joint venture with two Dutch scientists: Gerrit Baauw (former IBM Poughkeepsie, N.Y.) and A. J. W. Duijvestijn of the Twente Polytechnics in the Netherlands.

Under the direction of Dutchman Frits Carels at the Uithoorn center,

The Netherlands became the European know-how center for international computing, providing the operational expertise for the International Business Services offering.

BS12 became the primary tool for handling large volumes of mutidimensional relational data structures, equivalent to SQL/DS and DB2 in the U.S. Lattimer says, "Under IBS, the power of BS12 can be combined with the user-friendliness of Application System."

Data is displayed by using the Graphical Data Display Manager. Both AS and BS12 run under IBM's Virtual Storage Personal Computing time-sharing service. SNA gateway software is installed in the NCP/VTAM domains of International Network Services network systems and SNA user networks worldwide.

Today, 3081s in Tampa, Fla; Zoetermeerm, Netherlands; and Tokyo support all computing and processing for the worldwide International Network Services network, while 4381s running MVS/XA handle all network activities and network management.

Early in 1984, the European International Network Services organization based in Brussels became an independent business unit of IBM. IBM operations in each European country run their local Information Network Services with the IBS network, controlled from the Netherlands in the middle. "Now we are in a strong position to extend on a global basis our services offerings," Lattimer says.

In Zoetermeer recently, a dedicated International Briefing Center was established. An advanced "electronic boardroom," as Lattimer calls it, the center is a place where international DP executives from IBM and guest speakers can discuss the role of data processing and international computing using the latest data processing technologies.

IBM thriving in foreign sites

By Amiel Kornel, International Editor
CWN Europe

PARIS — Calling the U.S. economy the main culprit in the current computer industry slowdown, IBM President and Chief Executive Officer John Akers said last month that IBM expects revenue growth in 1985 to come from markets outside North America.

Akers, speaking at a meeting of investment analysts in Scotland, expressed satisfaction over the company's overseas business, placing most of the blame for lower revenue on the U.S. economy. He pointed out that in Europe, the Asia-Pacific area and Latin America, IBM's business has been growing very well, with shipments exceeding last year's by healthy rates.

Presentations by top corporate officials emphasized the healthy picture of IBM's overseas subsidiaries.

"Through October, we continued to ship worldwide at rates ahead of 1984," Akers said, "with essentially all the growth coming from outside North America." He expressed pessimism over the chances of an improvement in the U.S. economy in 1986.

Allen Krowe, IBM senior vice-president, underscored Akers comments by saying that the strength of the dollar had masked the healthy growth of the company's foreign units. "In the currencies of our individual countries, our business is even stronger, but its strength is being masked by the recent high levels of the U.S. dollar," he noted.

Krowe also said that although a decline in the number of IBM employees in the U.S. is expected up to the end of the year, there will be "healthy increases in employment" in Europe and Southeast Asia.

But while stressing the importance of IBM's foreign business, he warned: "Countries with high corporate tax rates may find themselves at an increasing disadvantage in attracting foreign investment."

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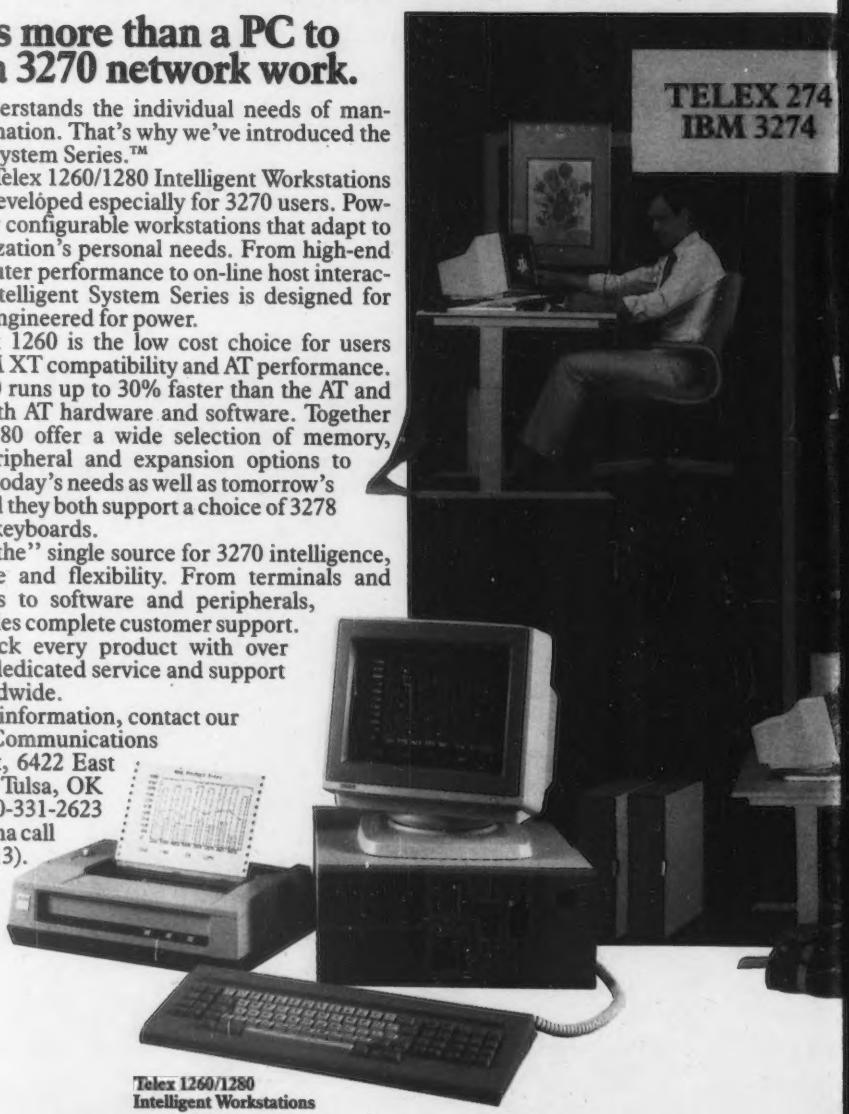

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IBM International

Some European governments are under pressure from local businessmen who are irritated about tax breaks offered to U.S. and Japanese companies as incentive to expand subsidiaries in those countries.

Long-term prospects good

Akers said that long-term prospects for the industry and IBM are good. In addition to citing accelerating product cycles and decreasing production costs, he pointed out that the growing possibility to compete in areas such as telecommunications that have been under government control in many countries "spells opportunity for our industry and our company."

Kaspar Cassani, chairman of IBM Europe/Middle East/Africa, noted procurement contracts and joint ventures with major European firms as examples of ways in which IBM is fortifying its overseas position.

He said IBM would continue to increase procurement from outside companies, a concept worth $1.6 billion in 1984. IBM currently has contracts with Siemens AG of West Germany, France's Thomson-CSF S.A., N.V. Philips of the Netherlands and others to supply items such as chips and VDTs.

Cassani added that the production schedule of the company's new 3090 series was being accelerated at the Montpellier, France, plant that serves all Europe.

In Europe, the Asia-Pacific area and Latin America, IBM's business has been growing very well, with shipments exceeding last year's by very healthy rates.

A good citizen in Denmark

By Jens Michael Damm, Chief Editor
Computerworld Denmark

COPENHAGEN — Denmark is one of the most IBM-dedicated nations in the world. It is no coincidence that IBM is six to 10 times larger than its closest competitors — NCR Corp., Olivetti and Sted, Ericsson Ltd. and Denmark's RC Computer.

The "hit lists" prepared by International Data Corp. Scandanavia for the Danish computer market show that IBM is almost always an uncontested first, both in installed base and in profit for 1984. Whether it be deliveries for state institutions or private enterprise, the result is the same.

In 1984, IBM Denmark A/S achieved a gross sales volume of $374.2 million (U.S.), or $40 million more than in 1983. In 1985, the total is expected to be well above $400 million.

After taxes, the balance was $49.8 million in 1984, and IBM sent the Danish government a check for $32 million worth of taxes, which makes IBM one of the biggest taxpayers in Denmark. The previous year, the tax bill was $27.7 million.

If one looks at the turnover, IBM's 2,151 employees each sell $170,000 worth of computer products, hardware and software. IBM is also among Denmark's largest exporters. In 1984, exports amounted to $65.7 million. The value of IBM's exports is expected to exceed $100 million this year.

IBM, which from 1920 to 1950 was represented here by an agent, has in recent years made a considerable effort to rid itself of its multinational image. The "foreigner" image does not go down well with the Danish mind; consequently, IBM makes an effort to become a well-adjusted citizen — just look at the amount of taxes the company paid. Taxes paid by the international oil companies are considerably less.

IBM does not want to be simply an import industry with little export. The endeavors to become a good Danish firm are expressed in IBM Denmark's subcontractor program, International Procurement Office (IPO). Ninety-seven Danish industries deliver power supply units, printers, printed circuits and plastic cabinets for IBM plants around the world. They include, among others, the ITT company — Standard Electric — which produces the electronic content of IBM's 4201 Proprinter.

The value of the total IPO labor is about $30 million to $40 million. The IPO project provides work for an additional 300 employees found in 100 plants across the country.

In spite of IBM's dominance, the company is not sleeping contentedly. On the contrary, it expects to expand soon with a new office building of more than 100,000 square meters in the beautiful countryside north of Copenhagen.

In the middle of 1986, IBM will also begin building a 10,000-sq-meter seminar center here, which will relieve the IBM center at Liding, Sweden.

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IBM International

Although officially the price of the 3090 has not been adjusted since its announcement, prices offered recently by IBM salesmen are well below catalog value.

In France, sales slipping

By Jo Cohen, Associate Editor
Le Monde Informatique

PARIS — Faced with slipping sales of its 3080 mainframes and poor performance by third-party dealers that distribute System/36 and 38 minicomputers and Personal Computers, IBM France is struggling to attain an "honorable" revenue by year end.

To succeed in presenting a serene image of its 1985 sales figures, IBM France might be obliged to dip into orders planned for the next financial reporting period, many analysts say.

Its most troubling sector is probably the large-systems market. Since the arrival of its 3090 series, IBM's French subsidiary has experienced a slowdown in sales of its 3080 models.

At IBM's Montpellier factory in southwestern France, where the big systems are manufactured for all European markets, an unsold stock of nearly 100 3080s are awaiting buyers. Although officially the price of these machines has not been adjusted since the announcement of the 3090, the prices proposed recently by IBM salesmen to several clients are well below catalog value. IBM-compatible makers such as National Advanced Systems Corp. and Amdahl Corp. already have reacted by lowering prices.

The reduction in sales of the 3080 is partly caused by many users deciding to wait for the introduction of the monoprocessor model of the 3090, the 3090 Model 100, expected for the beginning of 1986. This machine, with a performance of 14 million instructions per second, would compete directly with the 3081, already four years old.

What's more, secondhand 3080s have become the main competitors for new 3080 sales. The secondhand market for IBM machines has never been better, according to several computer service companies.

To maintain revenue in this difficult context, IBM is expected to deliver more 3090 Model 200s than initially forecast for France — 25 units shipped to clients by the year end, according to sources. This new delivery schedule would represent additional revenue of more than $150 million.

The company's problems at the lower end of its product line appear to be different than those rattling the mainframe sector. The problem is less one of international marketing strategy and more one related to difficulties specific to the national market. IBM's policy for low-end products is to make use of third parties, from which it hopes to garner 50% of its revenue.

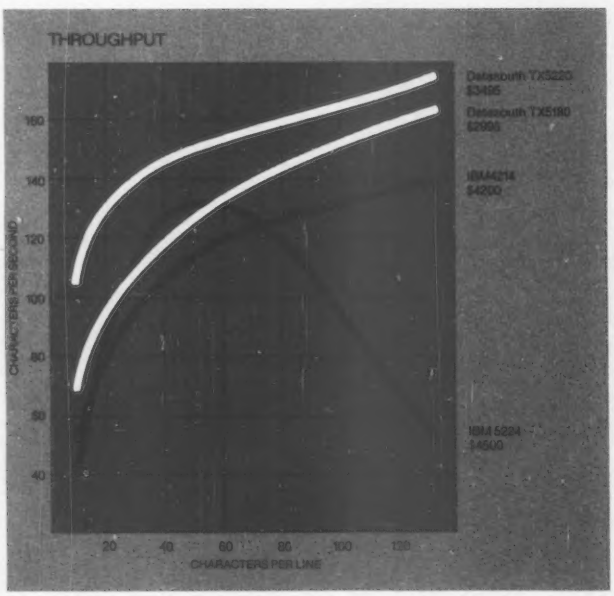
The commercialization of the System/36 demonstrates this approach. Computer service companies have been contracted as agents by IBM to sell the machines. According to IBM dealers, the System/36 is selling fairly well. But a quota system imposed recently by IBM France suggests that sales here are considered insufficient when compared with the product's potential and with sales in other countries.

The disappointing results in France originated in structural problems, analysts say. Dealers are often small companies whose commercial resources are not sufficient for selling large numbers of IBM System/36 machines.

The situation concerning the Personal Computer is similar. Insiders agree that IBM will not achieve its sales quota. Projections range from 35,000 to about 50,000 units, compared with IBM's original forecast of 80,000 units to be sold by the end of the year. Once again, the reason for the lack of sales, analysts say, is a lack of strong partners at the distribution level. To this structural problem, specific to the French market, one can add several errors in marketing that have been corrected only recently. The Personal Computer was presented to potential dealers at the French launch as a machine geared towards small and medium-size companies. The notion of selling it as a productivity tool for managers of large companies was introduced only recently in IBM's discussions with dealers.

This year will likely be an important one in IBM's development here. The company has placed an emphasis on the sales of its systems; in the past, leasing was at the base of the company's force and stability. About 10% of the revenue now comes from leasing, compared with more than 50% at the end of the 1970s. This change puts the company in a greater position of vulnerability, as this year's worldwide results indicate.

THE TRUE TEST OF A 34/36/38 PRINTER IS HOW IT HANDLES THE CURVES.



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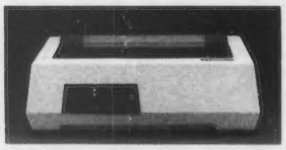

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IBM International

Lion's share in Sweden

By Peter Tegelberg, Staff Writer
Computerworld Sweden

STOCKHOLM — Software and peripherals currently drive the growing market for IBM products in Sweden. In 1984, IBM Sweden employed 4,200 people and saw a turnover of $739 million (U.S.), up from $718 million in 1983. Net profit was $44 million (in 1983, $32 million).

Export sales accounted for $263 million gross (in 1983, $237 million), of which the lion's share came from products manufactured at the Jarfalla plant just outside Stockholm. The increased export sales reflect a growing demand for the plant's two main product lines — printers and controllers for disk storage systems.

The 3090 sits at the top of the line, but the IBM Personal Computers are heavily advertised. Analysts expect IBM Sweden during 1985 to sell about 14,000 micros, which would represent a 50% market share.

The 3090 currently sits at the top of the line, but the IBM Personal Computers and the smaller minicomputers are heavily advertised. Analysts expect IBM Sweden during 1985 to sell about 14,000 micros, which would represent a 50% market share. The price of a standard Personal Computer with 256K-byte memory, two disk drives and a monochrome screen is $3,168, excluding value-added tax.

At the same time, there are few software programs on display in most IBM computer stores. Mainly they are the company's own. IBM, however, regularly compiles a catalog listing all Personal Computer programs available. Five programs in the Assistant series were released in Swedish versions at $150 to $190 each.

Software focus

In the U.S., IBM made a strategic decision to increase its share of software sales from 10% in 1984 to more than 30% in 1994. In accordance with this goal, the IBM Nordic Laboratories, located outside of Stockholm, is growing fast. Currently, the laboratory employs 200 people, and frequently advertises for new personnel. The laboratory once developed special hardware products but now focuses entirely on software development in three areas:

- Financial systems — Financial Management Systems (FMS), used for producing financial reports; versions are available for large and medium-size companies.
- User-friendly products — Application Prototype Environment, a fourth-generation development tool.
- Plan and follow-up systems for large computer centers — Service Level Reporter to measure service level according to specifications such as response performance. Operation Planning Control for planning the operation in a computer center.

IBM markets worldwide all products developed at IBM's Nordic Laboratories.

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Sr. Programmer Analysts
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Ask IBM

Computerworld Extra *solicited the following questions from five executives in large computer-user organizations. We then asked IBM to respond.*

Kenneth King, vice-provost for computing at Cornell University in Ithaca, N.Y., asks, "IBM is partner with Cornell in the creation of a national supercomputer center, based on a large-scale IBM host with Floating Point Systems, Inc. attached scientific processors.

"How serious is IBM about marketing to the high-end scientific and engineering fields in the long-term? Does IBM intend to develop higher performance products with power comparable to the machines being developed by major Japanese companies?

The IBM 3090, with outstanding scalar and parallel capabilities, and the recently announced 3090 Vector Facility are examples of IBM's continuing interest in and commitment to high-end scientific and engineering computing requirements.

Projects such as the Cornell study and others in which IBM is a participant further demonstrate IBM's corporate commitment to providing products and services that address these requirements.

Continued research into such areas as very large-scale integration will provide the technology foundation for increased computer system power and flexibility. IBM will continue to enhance product offerings to meet the needs of our customers.

Ken Palmer, vice-president of information systems technology at the Western-Southern Life Insurance Co. in Cincinnati, asks, "What breakthroughs in artificial intelligence might we expect from IBM between now and the early 1990s, particularly for financial institutions? How might these breakthroughs affect traditional MIS organizations and/or MIS' role in the corporation?"

IBM has a long history of accomplishments in the field of artificial intelligence, an umbrella term applied by computer scientists to complex problem solving, perception, reasoning, planning and other functions associated with human thought.

IBM's contributions to the field of artificial intelligence are most appropriately characterized as part of the continual evolution of computer systems, rather than as "breakthroughs."

IBM offers four mainframe products that use artificial intelligence techniques: Expert System Environment/VM, VM/Prolog, LISP/VM and Intellect.

We believe that there is great potential for using AI techniques effectively in a broad range of applications, including the financial and insurance industries.

IBM also believes that AI techniques can be integrated into existing MIS departments and can help the departments be more responsive to the changing needs of end users.

While would not speculate on future products, research continues on expert systems, computer algebra, natural language processing, speech recognition, handwriting and character recognition, robotics and vision.

Larry Myerley, manager of technical support services for Cities Service Oil and Gas Corp., Tulsa, Okla., asks, "Users have stated their requirements for integration of data associated with an installation's management of various IBM product lines and environments.

"This concept of a single, central repository of data for hardware/software management, networks, applications support and administration has not become a reality but seems to be a strategic direction.

"What is IBM's current position and direction for the development of such a facility?"

We are continuing to explore technical alternatives to satisfy the requirement for a data management facility. Beyond saying that, we will not speculate about future plans.

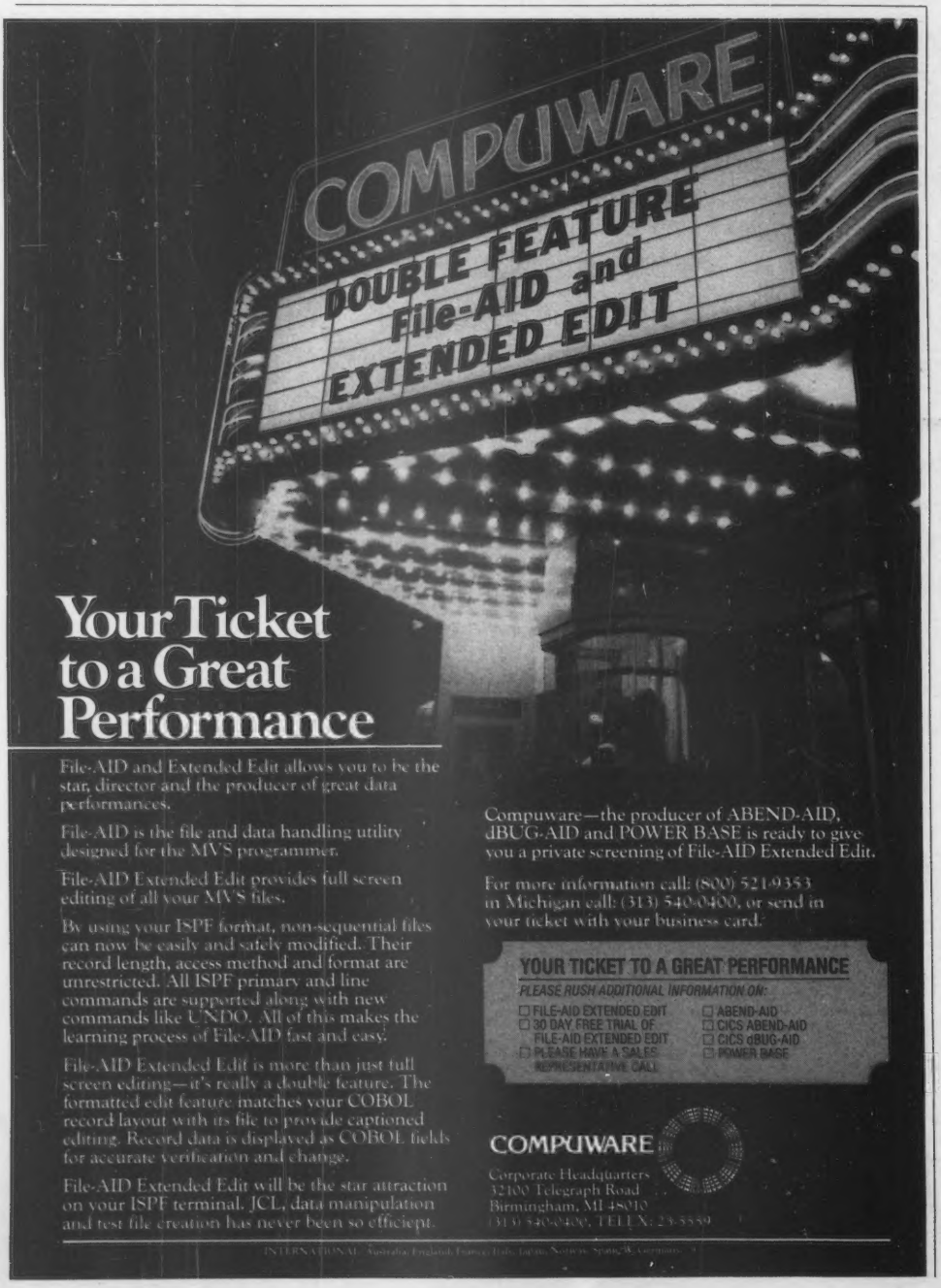
Ken Gabrys, manager of computer facilities and operations for Amoco Corp. in Chicago, asks, "There is an emerging requirement for on-line business functions for continuous processing 24 hours a day, seven days a week.

"In the 3080 and 3090 hardware environment using the MVS operating system with either the CICS or IMS subsystem, how will I be able to address this requirement in a straightforward way, looking at both reliability and maintenance?"

Two of the IMS development group's high priorities have been and continue to be supporting the high-end customer's growth rates and achieving higher availability for IMS end users. The February 1985 announcement of the 3090 and IMS/VS Version 2 with XRF is a clear demonstration of this commitment.

The IMS development team continues to place high priority on further reduction of the requirement for scheduled outages and minimizing the impact of unscheduled outages.

The recent CICS/OS/VS 1.7 announcement demonstrates our efforts to improve CICS/VS continuous operations and availability.



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Ask IBM

The Resource Definition On-Line function now allows definition of VTAM terminals, Multiregion Operation and Intersystem communications sessions, MVS operating system consoles, programs, transactions and maps to be added or changed on-line without the need to stop CICS operation.

The automatic installation facility allows VTAM terminals to be defined dynamically when the user logs on. CICS/VS also shows significant improvements in the time it takes to initialize or restart CICS, further reducing the impact of planned or unplanned outages.

In addition, IBM has made a statement of direction that it intends to improve the availability to the Systems Network Architecture terminal user of a CICS/OS/VS subsystem in a MVS/XA environment by enhancing the CICS recovery process with selected XRF functions to be consistent with CICS structure and facilities.

John Hogan, head of technology and strategy for European consumer business at Citibank, N.A., in London, asks, "For virtually any software problem an installation encounters, there is usually a solution within the IBM product line. The difficulty is trying to get multiple solutions to run together in the same environment. One of the best examples is in various on-line software products, where there are a million different editors available, such as those under TSO, CMS, word processing software . . . the list goes on. Right now they each have a different style of communication with the user.

"A more significant example is in the data base world of IMS, DB2 and System/38. IBM's Data Dictionary supports different data base management products unequally, or not at all in some cases, which creates problems for people trying manage data bases. When will IBM strengthen the role of the 'keeper of the standards' and develop an overall architecture?"

No response.

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Whether in telecommunications or computers, IBM is reaching out in all directions.

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☐ **SENIOR PRODUCT SUPPORT SPECIALISTS** - Experience supporting comm/and operating system software. VTAM, SNA utilities (i.e. NCC).

☐ **SYSTEMS ANALYSTS** - Installation and monitoring experience. Knowledge of OS, VS, MVS JCL, utilities ISMP and TSO, assembler, Focus and IDMS experience.

☐ **PROGRAMMERS** - IBM software support product installation and support. DBMS and PL/1 coding experience, OS MVS, MVS JCL, database utilities and Assembler coding.

☐ **SYSTEM PROGRAMMERS** - IBM software product installation and support (MVS system internals). Knowledge of IBM OS/VS/MVS, JCL, utilities, SMP, TSO or ISPF/PDF, Assembler coding.

☐ **SENIOR SYSTEM PROGRAMMERS** - Knowledge of IBM SNA Networking. Product installation and support (IBM JCL, utilities, SMP, TSO). Experience with ACF/VTAM, or NCP, NPM, X.25, NCCF, etc...

☐ **MVS SYSTEMS SPECIALISTS** - Responsible for the design, installation, implementation and qualification of OS software and IBM program update tape maintenance using SMP/E. Requires 4 years IBM Systems experience SMP/E, JCL, ALC, JES 2 and IBM utilities, MVS/XA, Dump Analysis and problem determination. Some positions involve vendor interface and others coding of large OS projects.

☐ **DATA SECURITY AUDITOR** - Experience with Audit Software such as RACF, ACF-2, or SECURE Report Writer and data security monitors, applications level security software packages such as GUARDIAN or TOP-SECRET and applications systems which utilize SMF Data such as TSO/MON or RMF/MON.

NETWORK COMMUNICATIONS

☐ **SNA NETWORK SPECIALISTS** - Comm specialist familiar with tech control, data comm, protocol interfaces, polled networks.

☐ **FORTRAN PROGRAMMERS** - Financial Applications experience using Case/Yourdon design methodology. Both junior, intermediate and senior positions available.

☐ **SENIOR SYSTEMS SPECIALISTS** - Comm software development network experience with knowledge of network protocols (X.25).

IBM APPLICATIONS PROGRAMMERS

☐ **SENIOR PROGRAMMER/ANALYSTS** - Experience in large application development of IBM MVS equipment (COBOL, CICS). Knowledge of IBM Comm. DIA/DCA, E-Mail, X.400.

☐ **PROJECT MANAGERS** - Experience in large IBM systems application (COBOL, ALC, CICS). PM or tech leadership experience. Knowledge of DIA/DCA. IBM Comm.

☐ **SENIOR SYSTEM SPECIALIST** - Experience in installing and support and performance tuning, MVS, XA, CICS, and TSO, PL/1, COBOL, IDMS (or IMS) in a VM operating systems environment.

☐ **SYSTEM ANALYSTS** - Experience in design and development of large system application for E-Mail or Medical systems. COBOL, ALC, PL/1, IMS or IDMS desired.

☐ **PROGRAMMER ANALYSTS** - Program design and COBOL or PL/1 under MVS/XA (IMS, or IDMS with Assembler preferred).

HONEYWELL SYSTEMS PROGRAMMERS

☐ **SYSTEMS PROGRAMMERS** - Experience with Honeywell Systems. Knowledge, experience with Data Access methods and methodologies; Application/Systems work; GMAP; Data Storage Mediums; Resource Contention Management; and Data Security and Integrity.

COMPUTER OPERATIONS

☐ **NCCF ANALYSTS** - Requires 2 years experience in a large IBM operations environment using state-of-the-art IBM communications hardware and software. Good working knowledge of MVS, TSO, CLIST and ISPF. Communications experience with VTAM, NCCF, MPDA, NLDM and TCAM.

If you have 3 or more years of applicable IBM experience, you may qualify for one of the positions outlined above. Check the appropriate box, complete the form below and mail this entire ad, along with your resume and salary requirements to: J. Vernon Peterson, Headquarters and Technology Staffing, GE Information Services Company, Mail Station MC1SE, Dept. 234355, 401 N. Washington Street, Rockville, MD 20850. One of our Managers will be calling you to discuss your qualifications in more detail. An Equal Opportunity Employer.

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